Committee on
Northern Population
Research

Comité de
Recherche sur les
Populations Nordiques

Proceedings Northern Population Workshop IV

Actes du Quatrième Colloque sur les Populations Nordiques

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PROCEEDINGS

NORTHERN POPULATION WORKSHOP IV

"Regional Development and
the Role of Population Research"

ACTES DU QUATRIÈME COLLOQUE SUR LES POPULATIONS NORDIQUES

"Développement régional et
rôle de la recherche démographique"

Navigator Inn
Frobisher Bay, N.W.T.

30 and 31 August 1982 /
30 et 31 août 1982

EDITOR / ÉDITION

KENNETH DE LA BARRE

PROJECT CO-ORDINATOR / COORDINATRICE DU PROJET

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- Ministère des Affaires indiennes et du Nord canadien:
  - Bureau du Conseiller scientifique sur le Nord (Politique et coordination du Nord);
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- The Samuel and Saidye Bronfman Family Foundation.
- Université de Montréal.

* * *

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The Committee on Northern Population Research

Since its formation in 1977, the purposes of the Committee have been to:

(a) encourage northern population studies to be undertaken by universities, as well as government and other agencies;

(b) establish an informal clearing house of information pertaining to sources of northern demographic data;

(c) prepare the organization of workshops, conferences and other meetings on northern population problems to be held in the North, and to involve a large measure of direction and participation by the autochthonous people;

(d) plan and sponsor one or more longer-term research programs to be carried out, in the main, by university based researchers;

(e) submit to appropriate bodies, for their consideration, briefs or reports on matters pertaining to the collection, analysis or reporting of demographic data.

* * *

Le Comité de recherche sur les populations nordiques

Depuis sa création en 1977, le Comité s'est efforcé:

(a) d'encourager les agences gouvernementales et autres, ainsi que les universités à entreprendre des études sur les populations nordiques;

(b) d'établir un service d'information en démographie nordique;

(c) de préparer l'organisation de colloques, conférences et autres réunions portant sur divers problèmes touchant les populations nordiques; ces manifestations, tenues dans le Nord, doivent impliquer une participation active des autochtones;

(d) de planifier et parrainer un ou plusieurs programmes de recherche à plus long terme, ces programmes devant être menés principalement par des chercheurs universitaires;

(e) de soumettre pour considération aux organismes appropriés, des rapports ou des résumés ayant trait à la collecte, à l'analyse et à des compte rendus de données démographiques.

Members of the Committee on Northern Population Research / Membres du Comité de recherche sur les populations nordiques

Robert M. Bone, Professor, Department of Geography, University of Saskatchewan, Saskatoon (Saskatchewan). Chairman.

Kenneth de la Barre, Deputy Executive Director, Katimavik, Montreal (Québec). Secretary and Co-ordinator.

Jacques Gagnon, Directeur, Service de production et de soutien, Statistique Canada, Ottawa.

Colin Heartwell, Chief, Economic Research and Planning Branch, Government of Yukon, Whitehorse (Yukon).

Ralph Joyce, Statistician, Bureau of Statistics, Government of the Northwest Territories, Yellowknife (NWT).

William B. Kemp, Consultant for Makivik Corporation (Montreal), and Professor at the Department of Geography, McGill University, Montreal (Québec). Vice-Chairman.

* Ginette Lachance-Brulotte, Agent d'études sociales, Environnement Canada, Bureau de la Baie James et du Nord québécois, Ste-Foy (Québec).

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Peter Schledermann, Executive Director, Arctic Institute of North America, University of Calgary, Calgary (Alberta).

Andrew Siggner, Head, Regional and Social Economic Section, National Energy Board, Ottawa (Ontario).

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* Corresponding member / Membre correspondant.

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FOREWORD

The meeting in Frobisher Bay was part of a series of workshops organized by the Committee on Northern Population Research under a mandate established in 1977 "to organize workshops, preferably in the North", and to "find a mechanism that would facilitate greater cooperation between researchers, governments, and northern organizations". Previous workshops were organized in North Hatley (1976), Whitehorse (1977), McGill University, Montreal (1979), Ste-Adèle, Québec (1980) and Yellowknife (1981). Proceedings were published for the 1976, 1979 and 1981 meetings, and summaries of the other meetings appeared in the 1980 Progress Report of the Committee.

As with previous workshops, the Frobisher meeting allowed researchers to meet together in an informal setting, to discuss their work, to test their ideas, and to report on the progress of their research.

The workshop also was an occasion to discuss the significance of demographic research with people who are working in related fields such as political science, or renewable and non-renewable resource developments.

Finally the workshop was an opportunity for researchers, (who in the event were largely from the south), to meet with northerners to explain the nature of research which is underway, and for them to receive some feed-back on whether the research is addressing relevant problems affecting the northern populations.

These proceedings include texts of all formal presentations made during the workshop. The variety of papers presented, and the level of discussion during the meeting, reflect both an increasing interest in northern population studies, and the sophisticated level of research underway in areas such as population projections, the relation of demography to economic analysis and forecasting, and the current interest in the political and social evolution of the Territories.

It is a pleasure to acknowledge, with special thanks, the contributions made by Mrs. Cynthia Mallon (Department of Economic Development, NWT Government) and Mr. Andy Theriault (Department of Indian Affairs and Northern Development) for their cooperation and for the excellent and hospitable local arrangements for the meeting.

By continuing to organize informal meetings of this kind, the Committee on Northern Population Research hopes it may continue to play a useful role as a facilitator of research which will benefit the northern populations of Canada.

K. de la Barre

Kenneth de la Barre
Secretary and coordinator
Committee on Northern Population Research

AVANT-PROPOS

La réunion de Frobisher Bay faisait partie d'une série de colloques organisés par le Comité de recherche sur les populations nordiques, après qu'on lui eut confié, en 1977, le mandat d'"organiser des colloques dans le Nord, de préférence", et "de chercher des moyens de promouvoir une meilleure coopération entre les organismes du Nord, les chercheurs et les gouvernements". Les colloques précédents ont été organisés à North Hatley (1976), Whitehorse (1977), Université McGill à Montréal (1979), Ste-Adèle, Québec (1980), et Yellowknife (1981).

Les actes des réunions de 1976, 1979 et 1981 ont été publiés, et de brefs comptes-rendus des autres colloques figurent dans le Rapport d'Activités 1980 du Comité.

De même que pour les colloques précédents, la réunion de Frobisher a permis aux chercheurs de se réunir afin de discuter de leur travail, d'échanger leurs idées et de rendre compte de l'état de leurs recherches.

Ce colloque a aussi donné l'occasion de discuter de l'importance de la recherche démographique avec des chercheurs oeuvrant dans des domaines connexes, telles les sciences politiques, ou l'exploitation des ressources renouvelables et non-renouvelables.

Enfin, cette réunion a permis aux chercheurs (qui venaient du Sud, pour la plupart) de rencontrer des gens du Nord pour leur expliquer la nature des recherches en cours et recevoir, en retour, l'avis de ces derniers sur la pertinence de ces recherches quant aux problèmes qu'ont à résoudre les populations nordiques.

Ces actes comportent le texte de toutes les communications présentées lors du colloque. La diversité des sujets et la qualité des discussions reflètent à la fois l'intérêt croissant que suscitent les recherches sur les populations nordiques et la complexité des recherches en cours, dans des domaines tels que la projection démographique, le lien

entre la démographie d'une part, l'analyse et la prévision économique d'autre part, et enfin, l'intérêt que l'on porte actuellement à l'évolution politique et sociale des Territoires.

Il nous fait plaisir de témoigner notre profonde gratitude à Madame Cynthia Mallon (Développement économique et tourisme, Gouvernement des Territoires du Nord-Ouest) ainsi qu'à Monsieur Andy Theriault du Ministère des Affaires indiennes et du Nord, pour leur précieuse collaboration et l'excellent accueil reçu à Frobisher.

En continuant à organiser des rencontres de ce genre, le Comité de recherche sur les populations nordiques espère pouvoir continuer à remplir sa tâche qui est d'encourager la poursuite de recherches qui soient profitables aux populations nordiques du Canada.

K. de la Barre

Kenneth de la Barre
Secrétaire et coordinateur
Comité de recherche sur les populations nordiques.

PROGRAMME

Northern Population Workshop IV /
Quatrième colloque sur les populations nordiques

"Regional Development, and the Role of Population Research" /

"Développement régional et rôle de la recherche démographique"

Navigator Inn
Frobisher Bay, N.W.T.

30 and 31 August 1982 /
30 et 31 août 1982

* * *

a.m. : Registration/Enregistrement.

p.m. . Preview/Tour d'horizon - workshop co-ordinator/coordonnateur du colloque: Kenneth de la Barre (Katimavik, Montréal).

. Welcome/Bienvenue: Andy Therriault (Department of Indian Affairs and Northern Development, Frobisher Bay).

. Introduction - Chairperson/Président: Andrew Siggner (National Energy Board, Ottawa).

Presentation of workshop objectives and general overview of population studies in the North. / Présentation des objectifs du colloque et regard sur les études de population dans le Nord.

Workshop Objectives / Objectifs du colloque

1. To provide a non-technical forum for the review and discussion of demographic research relevant to the North. The emphasis is on social, economic and behavioral matters which might explain the dynamics of population change in the North in such fields as political development, health, economic development, and social and environmental impact studies./

   Fournir le cadre d'un forum non-technique qui permette l'examen et la discussion sur la recherche en démographie, pertinente aux régions circumpolaires. Ce forum doit souligner particulièrement les aspects

sociaux, économiques et de comportement des populations, lesquels en termes pratiques, devraient expliquer la dynamique des changements de population dans le Nord en vue d'une planification dans les domaines de l'habitation, de la santé, de l'éducation et des études d'impact social et de l'environnement.

2. To provide an opportunity of encouraging the interest and cooperation of northerners in demographic research. / Fournir une opportunité aux résidents du Nord, de développer un certain intérêt et une collaboration en ce qui a trait à la recherche démographique.

3. To examine a number of major development themes in the circumpolar regions as "case studies", and discuss some of the major social-demographic impacts of these developments on the populations of the North. / Examiner un certain nombre de projets majeurs en développement dans les régions circumpolaires comme "études de cas", et discuter certains impacts démographiques majeurs découlant de ces projets sur les populations du Nord.

<u>August 30th/30 août</u>

<u>p.m.</u>

- William B. Kemp (Research Officer for Makivik Corporation and Professor at the Department of Geography, McGill University, Montreal).

  "Population growth, harvesting and land use".

- Ignatius E. La Rusic (Director of Research, ssDcc Inc., Montreal).

  "The Income Security Program for Cree Hunters and Trappers: Population Issues".

- Frances Abele (Research Associate, Northern Political Studies Program, Arctic Institute of North America, University of Calgary).

  "A Framework for Mutual Benefit: Social and Political Research in the North".

- Harold W. Finkler (Research Officer, Northern Research Division, Department of Indian and Northern Affairs, Ottawa).

  "The Role of Demographic Data in Socio-Legal Research in the Northwest Territories".

<u>August 30th/30 août</u>

18h00 : Wine and cheese reception/Vin et fromage. Host/Hôte: Committee on Northern Population Research/Comité de recherche sur les populations nordiques.

<u>August 31st/31 août</u>

<u>a.m.</u> . Introduction of day's programme/Programme de la journée. Chairperson/Président: William B. Kemp.

. Margot J. Wojciechowski (Senior Research Associate for Eastern Arctic Study and Assistant Director for Centre for Resource Studies, Queen's University, Kingston).

"Mineral Developments in Canada's North: The Eastern Arctic Study Case Study Series".

. Edward T. Pryor (Census Manager, Social Statistics Field, Statistics Canada, Ottawa).

"The Population of the Far North: Early Results of the Census".

. Duane Rajsigl (Master's Student, York University, Toronto).

"Socio-Demographic Correlates of Infant Mortality in the Eastern Arctic".

. Hans Oluf Hansen (Professor, Institute of Statistics, University of Copenhagen, Denmark).

"Some Aspects of Recent Infant and Adult Mortality in Greenland".

<u>p.m.</u> . Robert Choinière (Agent de recherche, Département de démographie, Université de Montréal).

"Demographic Evolution of the Inuit of Northern Québec, the Northwest Territories, Greenland and Alaska from 1930 to the Present".

. Jack C. Stabler (Professor, Department of Economics and Political Science, University of Saskatchewan, Saskatoon).

"Population Forecasting with Economic Simulation Models".

<u>August 31st/31 août</u>

<u>p.m.</u> . Robert W. Reid (Chief, Forecasting and Analysis Division, Economic Strategy and Development Directorate, Department of Indian and Northern Affairs, Ottawa).

"Observations on the Migratory Activity of the Labour Forces of the Yukon and Northwest Territories".

. John W. Pomeroy (Department of Geography, University of Saskatchewan, Saskatoon).

"Socio-demographic Field Investigations for the Norman Wells Database Project".

. William B. Kemp: General summary of workshop activities; feed-back from participants regarding achievement of workshop objectives, and conclusion. / Résumé général des activités du colloque; réaction des participants pour déterminer si les objectifs fixés ont été atteints, et conclusion.

* * *

The Income Security Program for Cree Hunters and Trappers: Population Issues

Ignatius E. La Rusic

Director of Research
ssDcc Inc. *

In this paper I want, first of all, to describe that feature of the James Bay and Northern Québec Agreement which provides the hunters and trappers of the Cree area with a form of Guaranteed Annual Income that is specifically tailored to the needs of the subsistence economy of the sub-arctic. Secondly, I would like to make a few comments on issues relating to the use of population data in the analysis of program operation. The first part may be of general interest to people in the Canadian North who may be attending this workshop, the latter comments may be of more particular interest to the demographers gathered here.

I should begin by noting that the Cree Income Security Program is a form of hunters' support scheme which is quite different to the many which are in operation in various provinces and in the Territories. These latter programs frequently have their ideological foundations set on the notion that government is shoring up in some way, a sector of the economy - in this case, the fur industry - which is in temporary trouble and a program is put into effect to assist some individual trappers over a bad year. So, even if the programs are repeated each year, they are not permanent in concept; the notion persists that one year, either people will grow tired of the effort and settle down to modern wage labour or perhaps to be a normal welfare recipient, or that perhaps the trapping industry will once more rise to its former pre-eminence making the support unnecessary. So, there is a notion of temporaryness in hunters' support programs and there is also another feature about them which is in fact a hold-over from an earlier day - the notion that government officials are actively involved in planning details of the hunting expedition. So government agencies are involved in chartering aircraft, making bulk purchases of gear or even determining the site of the hunt. Such involvement is reminiscent of the approach to welfare in the 1940s and 1950s when vouchers were issued for "rations" in kind, based on the fear that normal people did not know how to intelligently spend the cash equivalent, or perhaps spend it on frivolities. As the American wit, O. Henry, commented some years ago, it is the great fear of philanthropists that the recipients of their charity might spend it on coloured portraits of themselves rather than giving it to the installment man.

* Corporate name: Consulting services in social sciences, development and culture change. / Centre de recherche et d'analyse en sciences humaines.

The Cree program is quite different in concept. It not only is established as a permanent program, but it also puts the cash in the hands of the people to make of it what they may with the confidence that people make the choices which are intelligent in their own terms. It is moreover a program for the support of a way of life which has been defined as important by the Cree at the community level. It is for the support of subsistence hunting and trapping; it's relation to the "fur industry" is a secondary consideration.

When the Cree negotiators of the James Bay Agreement were setting out their demands for a just settlement, they naturally put considerable emphasis on matters which would effect the economic development of the region. It was recognized that a very important sector of the local population was involved in subsistence production. It is not the place here to trace the recent works of geographers and anthropologists who have put something like absolute values on the hunting economy in terms of food replacement costs. We shall only say that the Native Harvesting Research Committee suggests edible weights of something between 2 and 3 million pounds annually (for the metric minded, in the 1 million to 1.35 million kilo range). For the Cree who were negotiating without the benefit of the later scientific precision, they only were certain that the subsistence sector provided their communities with a very large quantity of largely irreplaceable food. That sector needed to be protected and developed to its capacity especially for the one-half the population who essentially would find no slot in whatever programs might eventually emerge under the guise of some scheme for economic development of the region. About half the Cree were, as we say "on the land" in the mid-1970s, and although the total, as a percentage of the total population had been declining especially in those communities which had some wage employment, there were still 800 to 1,000 families living off the land.

The Cree approach to supporting and encouraging that sector of the economy took three forms: first a land regime secured access to the traditional hunting territories and the access to the most important food animals; second, the environment regime ensured that the land thus secured would be protected from further encroachments and degradation as a result of development projects; and third, the active, *bona fide* hunters, were provided with an income support program which assured them that hunting, fishing and trapping would remain a viable way of life for those who elected to follow that traditional lifestyle.

In the Cree area, the distinction between *bona fide* hunters and occasional hunters is relatively easy to discriminate. The style of hunting involves the family unit spending up to eight months in the bush. The Cree used this fact in establishing the minimum criteria for program eligibility. Those are eligible who spend at least 120 days a year (4 months) on what is called "harvesting or related activities", 90 of those days, (3 months) must be spent "away from the community". This is not a difficult goal for

most hunters to meet, for over half of the families spend fully 8 months on the land. It does however sort out the occasional hunters, and those who make regular but brief sorties to the bush for goose hunting or moose hunting, etc. There is a further eligibility criterium: the beneficiary unit, called the family or the single hunter who is associated with the program, must not earn more in the year from wage employment than from the harvesting activities.

Having met the eligibility criteria, the beneficiary unit is remunerated for each day spent in "harvesting and related activities". Note the emphasis on the word "harvesting" rather than "hunting", which reiterates the ideological basis of the program; the excursion to the bush is accepted to be one of harvesting a food supply as well as a fur crop. The payment for the time in the bush was originally set at $12.00 per diem for each adult in the beneficiary unit. Indexation to the cost of living has raised that to about $21.00 for the current year. By rewarding the contribution of all adults in the beneficiary unit, the program specifically recognizes the role of the women in the hunting group. Her days are counted as being of equal value to those of the husband; moreover, a woman may be the head of the beneficiary unit. The wording of the agreement and the act which formalized this section of the agreement provides that the consort of the head be paid the per diem. The total per diem payment for a couple today is about $42.00, and this amount is paid for up to 240 days per adult. Thus, in 1982, each adult can receive just over $5,000 for their time spent in harvesting activities; for a couple, the total would exceed $10,000.

A second feature of the program design provides for an additional payment to account for differences in family size. This feature is quite analogous to conventional guaranteed annual income theory. A basic amount is established in the Cree program in the following way. When the program was set up in 1975, the head of the beneficiary unit had the basic amount set at $1,000. If there was a consort, he/she also had the basic amount set at $1,000. For the existence of a family unit (whether or not there were children), $400 was added to the basic amount, and for each child under 18 (whether or not they accompanied the family to the bush), an additional $400 was added. For the first operational year then, the basic amount for a family of father, mother with two children was set at $3,200; for a family with five children, at $4,400, while the single individual had a basic amount of only $1,000. Annual indexation has raised these unit amounts to about $1,700 and $700 so that beneficiary units of the size just mentioned would have had 1981 basic amounts of $5,500, $7,600 and $1,700 respectively.

The basic amount, once established, is treated more or less as it is in a guaranteed income scheme. Any earnings of the beneficiary unit are calculated and a percentage of the total is deducted from the basic amount, the benefit being the residual. The reduction rate, or tax-offset rate as it is sometimes called, is set at 40% in the Cree program. Thus, for every dollar

earned, 40¢ is reduced from the basic amount of the unit and the residual, called the guaranteed amount, is received by the Cree family in addition to the payment received for the man-days spent in the bush. The total per diem payment is treated as family income and 40% of its value is deducted from the basic amount established for the beneficiary unit; the family receives a single cheque which includes all the per diem payment and the residual of the basic amount. By way of example, a family with five children could receive a maximum (based on the rounded values I have used above) of the following:

The per diem portion:

For the head of unit	- 240 days @ $21.00	:	$ 5,040
For the consort	- 240 days @ $21.00	:	$ 5,040
Total :			$10,080

The guaranteed amount portion:
(i.e. the residual of the basic amount)

The basic amount

For head of unit	:	$ 1,700
For the consort	:	$ 1,700
For the family unit	:	$ 700
For the children (5 x $700)	:	$ 3,500
Total basic amount	:	$ 7,600

Calculation: reduction of the basic amount

Income (from the per diem)	:	$10,080
(we assume no other income)		
Total income	:	$10,080
Offset rate (40%)		
40% of $10,080: $4,032		

Calculation of the guaranteed amount

The basic amount	:	$ 7,600
Less the 40% offset	:	$ 4,032
Equals the guaranteed amount	:	$ 3,568

<u>The total benefit received</u>:

The per diem payment	:	$10,080
The guaranteed amount	:	$ 3,568
Total income security payment or benefit	:	$13,748

In this example, other income, fur sales, etc. have been ignored. Other transfer payments received are deducted at the rate of 100% from the basic amount (child allowance is an exception).

In keeping with the notion that the program should be tailored for the needs of hunters and trappers, the benefits are paid on a quarterly basis (September, January, March and June), months which coincide with the period when hunters need substantial amounts of cash for outfitting for the bush. In 1982, the average annual benefit was about $7,500 per beneficiary unit (family).

The program is operated by an autonomous board which receives a special annual budget from the Québec government. The board is composed of three Cree members and three nominees from the Québec government. The Cree representatives have been employees of the Cree Regional Authority, the Québec representatives have been civil servants from the Ministry of Social Affairs. There is a small office in Québec which manages the program, and in each community, a local administrator maintains the direct contact with the beneficiaries, assisting them in the completion of the necessary forms and the distribution of the benefit cheques.

Since its inception in 1976, the program has had about 900 beneficiary units registered each year (600 families and 300 single people). When the program was initiated, about 1,100 beneficiary units enrolled, but the normal process of attrition in the "shake-down" period of the first two years reduced that number to the present 900. Overall, it appears that about 40% to 50% of the total Cree population is covered by the program. And it is the "looseness" of that 40% or 50% figure which may be of some particular interest to a conference of demographers.

I noted earlier that the Income Security Program was developed for the beneficiaries of the James Bay and Northern Québec Agreement. This is a larger group of people than was formerly included on the Indian Affairs band lists which had been used for community population statistics, projections, etc. Beneficiaries of the Agreement now include Indians who had been left off the band list through inadvertance, the families of women who had married non-Indians - essentially the non-status and Métis group. The new list called the *Registre des Autochtones*, has taken some

years to develop and, in the meantime, the Indian Affairs band lists have had to serve as the best estimates of the Cree populations. Given that there has been much comment that the James Bay and Northern Québec Agreement may be a model for future land claim settlements, perhaps there is a certain usefulness in developing new population data for the areas which incorporate non-status and Métis who will eventually be included in the group which will benefit from special programs emanating from potential agreements. One thing is clear in the Cree situation, it seems to take a few years to develop the administrative apparatus which can produce annual beneficiary lists with age, sex or residence breakdowns. And it is precisely in the initial planning of social type programmes that one needs good data for accurate projections.

In the Cree region, the additions to the band lists occasioned by the Agreement would not account for more than 2% or 3% of the total population. Where there are more significant differences is in the category "resident population". The Agreement beneficiaries are listed as "affiliated with" at particular community. Given that there may be more non-status and Métis who are affiliated, but non-resident, the estimating of resident populations is now a bit more complex, and moreover, even with new estimates established, the short time dimension of the new lists makes projections more questionable. Over time, it is certain that the data in the new *Registre des Autochtones* will be as precise as any produced by Indian Affairs, it is in the early years of the Agreement - precisely when new programs are being developed - that more accurate data would be particularly useful. Perhaps demographers might look at other parts of the Canadian North where land claim settlements are possible and begin the development of resident populations who would be eligible for new programs of social services, health or housing, etc.

But there is another special aspect of the population involved in the Cree Income Security Program which may be of some interest to demographers. When looking into the future of the program, we can see it serving a certain percentage of the resident population which overall is growing at a certain rate. We do know that there has been a decline in birth rate which of course would indicate that family size would be smaller in the future. Now, as we indicated, the benefit structure of the Cree Income Security Program is related to family size. Today, over 40% of the families with children covered by the program have four or more children. Clearly, if the average family size were to diminish, there would be significant implications for the program budgets; they would be reduced (in constant dollars) over time. However, suppose that the population dynamics of the hunting and trapping sector of the Cree communities were very different from the sector involved in wage labour or community based activities. There is some evidence in the Cree data I have looked at that the size of the family of the hunter sector of the population (and it is, as I indicated somewhere between 40% and 50% of the total Cree population, more likely fully half of the community population) have larger families than the other

sector. While one would want more precise data to argue the case, from what I have observed, there is a good case for at least the hypothesis that people in the traditional sector of the local economy continue to have higher birth rates than the other half of the community. Moreover, since their lifestyle puts the children under five or six into a bush environment for most of the year, it may be that they have different experience with childhood diseases, largely due to low exposure.

Whether or not those factors can effect the overall number of surviving children in a small population, I do not know. But it seems clear to me that there are two distinct population groups in the Cree communities of today. With very different lifestyles, it may be that they are reproducing at the rates we have experienced over the past couple of decades. If so, the family size of income security beneficiaries may well be much higher than the norm of the Cree area. That would effect projections of the cost of programs for future years. I raise the question, is it possible to consider research on sub groups of a population which everyone already seems to hold to be too small for intense study of population dynamics?

A detailed discussion of the Cree Income Security Program which has more precise data, and statistical materials up to the end of the 1980-81 fiscal year is now available in the recent study commissioned by Indian Affairs:

La Rusic, Ignatius E., Income Security for Subsistence Hunters: A Review of the first five years of operation of the Income Security Programme for Cree Hunters and Trappers, Research Branch, Corporate Policy, Department of Indian and Northern Affairs, Ottawa, March 1982.

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A Framework for Mutual Benefit: Social and Political Research in the North

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This paper discusses the importance of social impact assessment for other kinds of research in the North, and describes a program at the Arctic Institute of North America of the University of Calgary which will combine social research in the North with the training of northern native people to conduct such research on their own.

Social impact assessment is applied research, by definition. The term began to be widely used with reference to northern research in the early 1970s, when southern plans for major non-renewable resource development of the North collided with the fears and aspirations of northern native people about the consequences of this development for their way of life. The collision of these two interests held many consequences, for both parties. One of the consequences, which both have had to adapt to, has been the improvisation of a new process for making decisions about northern economic development. The process incorporates a rather ragged and variable, but now firmly entrenched, system of public hearings and inquiries which usually occur after a major project is proposed by the private sector, and before a decision to permit the project to proceed has been announced by the federal government.

The formal purpose of these hearings, and the purpose of the social impact assessment research for which they provide the occasion, is to provide information about some of the costs of the proposed project - costs which are not automatically included when the proponent is considering the project's viability, but which are important to society as a whole in political, moral and also economic terms. In a welfare state, sooner or later we all bear the costs of unfavourable social impact, and so the conduct of social impact assessment is important to us all.

However, the advent of social impact assessment as a kind of research has had some negative consequences for northern social and political research as a whole. Perhaps before discussing those consequences, I should say what I think the difference is between applied social research and the other kind. Applied social research asks very specific questions - for example, what

will be the effect upon the family structure or the rate of alcoholism in Sachs Harbour if the Beaufort Sea Exploration Program is approved and people from Sachs are employed in the program on certain terms? The purpose and such research is to determine the real cost of the proposed project, and to provide information which will reduce social costs and maximize benefits.

Social science research as it is practised at universities asks more general questions: what is going on here, and what does it mean? What can we learn about our society, and about human societies in general, from what is going on here? And sometimes, is this really what we should be doing?

Answering these general questions involves a kind of social impact assessment as well, in the sense that this sort of research must also include the investigation of particular events and effects. Further, the fruits of this research (when it is successful) include a soundly-based comprehensive understanding of the wider social context of a given project, and surely such an understanding should be applied when political decisions about major projects are taken. In the Canadian experience, this rarely happens. Comprehensive understanding is hard to come by - at least partly because so many research resources have been devoted to project-specific and limited time-span social impact assessment studies.

Since both enterprises are important, and since both might be said to rely upon the same data base for their different purposes, and since research in the North is very expensive, it would be convenient if the two enterprises were complementary. Sometimes they are, but there are almost always difficulties with using the results of social impact assessment studies which have been prepared for inquiries and public hearings to figure out what is going on in the North.

First, because social impact assessment studies are usually conducted with respect to a proposed new development, as a body they yield a necessarily skewed sample. Like the salvage archaeological survey which was done for a one mile wide, 2,000 mile long strip along the Polargas pipeline route, they are based upon a rather arbitrary data sample. The most important site for understanding Inuit prehistory might be 3 miles west of Polargas' proposed route, but it has not been surveyed. Similarly, a true picture of what is happening in the North must include studies of communities not directly in the line of developers.

A second difficulty with using social impact assessment studies is that by their very nature, they are short-term, conducted during the time after announcement and before commencement of the project. The study yields a snapshot, not a history, and it is hard to make judgements about the future

from one snapshot. Quite often still, the study is conducted by outsiders who are new to the community, and who do not have time to develop a trust relationship with community residents. There are problems of access and sometimes, of accuracy.

These limitations do not mean that social impact assessment studies are useless, but they do mean that artful interpretation is required to use them, and that certainly other kinds of data are needed.

It was with these considerations in mind that the Arctic Institute developed the Native and Social Issues Program. The word "Program" may be misleading, since no new infrastructure has been introduced, and no new staff hired. The Program is more like a policy direction.

It will encourage long-term and comparative research on northern social issues which are identified by northerners as important for academic investigation. While research conducted under the auspices of the Program will be conducted in a manner which respects normal scholarly principles of objectivity and balance, it will in addition endeavour to provide direct benefits to the residents of the North. These benefits will be derived in two ways.

First, northern residents and existing northern institutions will be engaged in the actual conduct of the research, either on their own, or working with southern-trained specialists to improve the skills which will enable them to design and execute other studies on their own. Such skills are of increasingly urgent need to native communities, organizations, and individuals in the North today, because they are fundamental to democratic participation in the decision-making process which precedes major resource development project approval. Second, research results produced under the sponsorship of the Native and Social Issues Program will be published not only in academic journals in the South, but also in easily readable form in the North -- in English and native languages in the regional media, or in magazine-format reports.

The first study sponsored by the Program will be a study of native employment training programs. It will have three objectives.

1. To review the history of government and industry native training programs during the last thirty years, in the context of changes in federal northern policy, changing external pressures on the North, and the progress of political development in the North.

2. To describe the present constellation of training programs conducted by the Territorial and Federal Governments, and by private industry.

3. To study over several years the implementation and impact of selected northern training programs, both those associated with current major northern resource development projects and those associated with government programs for northern employment and training. We plan to do case studies in three or four places in the Northwest Territories and Yukon.

In addition, the study itself will incorporate a training program for native northerners. At the moment, this training program is elaborately designed but as yet untried.

Two native people from the western Arctic who are undergraduate students at the University of Calgary will work on the history and survey parts of the study. During the case study phase, research will be conducted by research teams composed of one southern-trained social scientist and three northern native people who wish to acquire social science research skills.

During the first case study year, at each of four case study locations, conversational in-depth interviews will be conducted with individuals engaged in employment training programs, and with graduates of the programs who are both employed and unemployed. Other people from the employment trainees' communities will also be interviewed. In addition, detailed reports on the nature of the programs in which the interviewees are employed will be prepared, based upon information provided by the administering agencies and otherwise gathered in the communities.

At the conclusion of the first case study year, interim research reports will be produced in a small edition, primarily for distribution in the communities in which research has been conducted. During the interviews conducted in the second case study year, therefore, the previous year's research results will become an additional subject for discussion with interviewees. This review of researchers' conclusions by community interviewees will provide an opportunity to check the accuracy of information and inferences, as well as an occasion to discuss issues overlooked or insufficiently explored in the first set of interviews.

Training will be provided at the case study location by the senior field researcher. With the exception of one month at the beginning of the research season which will be devoted exclusively to discussing the nature and purposes of the project with trainees and preparing them for fieldwork, training will occur throughout the season as interviews are conducted and the results organized. At the conclusion of each season's research training program, each trainee will receive a letter of recommendation written by the study co-ordinator and the senior field researcher outlining the nature of the training received and the skills which the trainee has acquired.

People tell us that there is a real need for northerners, particularly native northerners, who are trained to do research in this way. We believe their participation will be a benefit to the study as well, by contributing to access to accurate information.

This study takes advantage of the freedom and, simply, the extra time available to researchers who are not working to a political deadline. The freedom is used to choose the most analytically interesting case study subjects - analytically interesting to northerners, as well as southern-based academics. The time is used to study conditions over a longer time, and to train people as the study is going on.

In this way, we will attempt to study social impact in a broader sense and in a way which will contribute to knowledge about the significance of northern development for the people it most directly affects. In the process, we hope to share with those people some of the skills which they will require to do their own analyses.

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The Role of Demographic Data in Socio-Legal Research in the Northwest Territories

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This article illustrates the use of northern demographic data as an element of criminological analysis during recent research of adult male correctional institutional needs for the Baffin Region. Specifically, on the basis of the socio-legal review of the Baffin Correctional Centre (Finkler, 1981), undertaken as part of the planning process for corrections in the Northwest Territories in the identification and formulation of the required range of institutional services in the Baffin, the discussion begins with an overview of the use of demographic data in the measurement of criminality and offender profile. Moreover, the employment of demographic analysis during the above research is demonstrated in the subsequent discussion on the incidence of crime, admissions to NWT correctional institutions, the incarceration of Inuit offenders, and institutional population trends. The article concludes with a discussion on the significance of demographic data in socio-legal policy.

I. DEMOGRAPHIC DATA IN THE MEASUREMENT OF CRIMINALITY AND OFFENDER PROFILE -

Socio-legal research on the identification and formulation of the required range of correctional institutional needs for the Baffin necessitated the measurement of regional criminality and offender profile. However, such measurement must go beyond absolute statistical numbers to be meaningful and relate to the population composition of the area involved. Consequently, wherever possible, recent Baffin correctional research endeavoured to correlate criminal statistics to variation and change in population characteristics including age, sex, ethnicity, and marital status, but also encompassing what Hauser and Duncan (1972) have classified as attained skills or qualifications such as level of education, pre-arrest employment status and occupation. The subsequent discussion demonstrates examples of demographic analysis during our socio-legal research.

A. The Incidence of Crime

Toward the determination of the incidence of crime in the Baffin, R.C.M.P. Sub-Division Crime Statistics were obtained for the period 1975-80,

entailing the number of actual offences proven to be founded. In addition to the regional distribution of the number of actual offences by R.C.M.P. Detachment, the correlation of crimes known to the police to the population involved enables us to compute crude rates or the frequency of crime per general population. Consequently, our descriptive statistics on the distribution of actual offences by R.C.M.P. Detachment, Baffin Region, N.W.T., 1975-80, represented by Table 1, become considerably enriched with the inclusion of demographic data reflected in Table 2, encompassing population estimates (Bureau of Statistics, GNWT, 1980b), by number of actual offences, percent of population and actual offences, offence rates per 1,000 population, and R.C.M.P. Detachment, Baffin Region, N.W.T., 1979. In regard to this index of crime, Table 2 indicates that Frobisher Bay is significantly over represented with an offence rate of 487/1000 in contrast to the regional offence rate of 226/1000, with Resolute Bay and Cape Dorset moderately over represented, entailing 271/1000 and 270/1000 respectively, and the remainder all under represented.

Unfortunately, police statistics fail to differentiate between the various population characteristics precluding the needed basis to adjust the offence rate for variations in the composition of the population - such as the changing ethnic and age structure of the population. In this regard, our correctional data lent itself more fully to the range of demographic analysis.

B. Admissions to N.W.T. Correctional Institutions

On the basis of our review of all adult admissions to N.W.T. correctional institutions, frequency of admissions per general population by location where offences occurred and ethnic origin enables us to determine to some degree the categoric risk of the population likely to be admitted as per their particular sub categories. For example, notwithstanding the small numbers, Table 3 illustrates the number of admissions by percent, rate, percent change, and location where offence occurred, N.W.T. institutions 1978-79. Thus, with respect to the percent distribution of admissions in 1978, while admissions from Fort Smith comprised 66% of the total, admissions from Inuvik predominated disproportionately when measured in terms of its frequency or rate of 2286.5 per 100,000 population.

Table 4 reveals the number of admissions by percent, rate, percent change, and ethnic origin, N.W.T. institutions, 1978-79. In regards to the percent distribution of admissions in 1979, while Dene represented 37.1% of the total, by considering population data (Bureau of Statistics, GNWT, 1980a, 1981) Métis admissions were over represented in terms of their rate of 3377.8 per 100,000 population.

TABLE 1

TOTAL NUMBER OF ACTUAL OFFENCES, BY RCMP DETACHMENT, BAFFIN REGION, NWT, 1975-80

DETACHMENTS	YEAR 1975 N	%	1976 N	%	1977 N	%	1978 N	%	1979 N	%	1980 N	%
Cape Dorset	186	8.3	234	15.4	167	10.4	147	9.1	196	10.5	306	12.8
Clyde River	21	.9	27	1.8	38	2.4	17	1.0	38	2.0	49	2.1
Frobisher Bay	1784	79.7	927	61.1	1024	64.0	985	61.3	1196	64.2	1499	62.9
Grise Fiord	3	.1	9	.6	8	.5	5	.3	3	.2	6	.3
Igloolik	20	.9	28	1.8	36	2.3	55	3.4	87	4.7	81	3.4
Lake Harbour	36	1.6	36	2.4	20	1.2	34	2.1	37	2.0	20	.8
Nanisivik					30	1.9	54	3.4	55	2.9	65	2.7
Pangnirtung	60	2.7	75	4.9	82	5.1	100	6.2	78	4.2	91	3.8
Pond Inlet	45	2.0	82	5.4	108	6.8	119	7.4	87	4.7	106	4.4
Resolute Bay	82	3.7	98	6.5	86	5.4	67	4.2	48	2.6	61	2.6
Sanikiluaq							24	1.5	38	2.0	101	4.2
Baffin Region TOTAL	2237	99.9	1516	99.9	1599	100.0	1607	99.9	1863	100.0	2385	100.0

TABLE 2

POPULATION ESTIMATES, BY NUMBER OF ACTUAL OFFENCES, PERCENT OF POPULATION AND ACTUAL OFFENCES, OFFENCE RATES PER 1000 POPULATION, AND RCMP DETACHMENT, BAFFIN REGION, NWT, 1979

Community	Population Estimate	Number Of Actual Offences	Percent Of Population	Percent Of Actual Offences	Offence Rate Per 1000 Population
Cape Dorset	725	196	8.8	10.5	270
Clyde River	443	38	5.4	2.0	85
Frobisher Bay	2454	1196	29.8	64.2	487
Grise Fiord	95	3	1.2	.2	31
Igloolik[1]	1162	87	14.1	4.7	74
Lake Harbour	300	37	3.6	2.0	123
Nanisivik[2]	668	55	8.1	2.9	82
Pangnirtung[3]	1223	78	14.9	4.2	63
Pond Inlet	652	87	7.9	4.7	133
Resolute Bay	177	48	2.1	2.6	271
Sanikiluaq	334	38	4.1	2.0	113
BAFFIN REGION	8233	1863	100.0	100.0	226

[1]Igloolik Detachment also comprises the community of Hall Beach.

[2]Nanisivik Detachment also encompasses the community of Arctic Bay.

[3]Pangnirtung Detachment also includes the community of Broughton Island.

TABLE 3

NUMBER OF ADMISSIONS BY PERCENT, RATE, PERCENT CHANGE, AND LOCATION WHERE OFFENCE OCCURRED, NWT INSTITUTIONS, 1978-79[1]

Location Where Offence Occurred	ADMISSIONS 1978 (T=683) Number	Percent	Rate per 100,000 pop.	1979 (T=575) Number	Percent	Rate per 100,000 pop.	Percent Change Number	Rate
Baffin	49	7.2	600.0	39	6.8	473.7	-20.4	-21.0
Keewatin	13	1.9	313.5	15	2.6	358.9	+15.4	+14.5
Inuvik	170	24.9	2286.5	90	15.6	1227.7	-47.1	-46.3
Fort Smith	451	66.0	1692.7	431	75.0	1637.5	-4.6	-3.3

1 We have deducted 7 and 39 admissions from the total number for 1978 and 1979 respectively, whose offence locations were outside of the NWT or unknown.

TABLE 4

NUMBER OF ADMISSIONS BY PERCENT, RATE, PERCENT CHANGE, AND ETHNIC ORIGIN, NWT INSTITUTIONS, 1978-79[1]

	ADMISSIONS							
	1978 (T=687)			1979 (T=606)			Percent Change	
Ethnic Origin	Number	Percent	Rate per 100,000 pop.	Number	Percent	Rate per 100,000 pop.	Number	Rate
Dene	274	39.9	3389.8	225	37.1	2668.1	-17.9	-21.3
Inuit	164	23.9	1089.4	125	20.6	807.0	-23.8	-25.9
Métis	148	21.5	3288.8	152	25.1	3377.8	+ 2.7	+ 2.7
Other	101	14.7	538.4	104	17.2	589.5	+ 3.0	+ 9.5

1 We have deducted 3 and 8 admissions from the total number for 1978 and 1979 respectively, whose ethnic origins were unknown.

C. The Incarceration of Inuit Offenders

In regards to our analysis of admissions to the Baffin Correctional Centre and offender profile, it should be noted that this regional community correctional facility, which opened on April 15, 1974, is for adult male offenders, 16 years of age and older; and that as a result of its cross cultural orientation, Inuit offenders, with the exception of three non-Inuit, have comprised all admissions. Notwithstanding that the above correctional data pertained entirely to male Inuit admissions, their number was correlated to such variables as age, level of education and pre-arrest employment status, in order to construct a profile of the offender. For example, Table 5, representing the number of Inuit admissions by age, Baffin Correctional Centre, 1975-80, illustrates the predominance of admissions between the ages of 18 to 29, comprising 192 or 69.9%, with a peak of those in the age category, 18 to 20, entailing 30.8% of the total.

With respect to the age on admission for Inuit admissions by level of education, Baffin Correctional Centre, 1980, Table 6 reveals that 55.7%, predominantly those between 18 and 20 years of age, had a level of education from grade 7 to 9; whereas admissions with limited education tended to comprise those 30 years of age and over. However, in correlating the level of education for Inuit admissions by pre-arrest employment status, Baffin Correctional Centre, 1980, as represented in Table 7, we find that 59.5% of all admissions, the majority with a grade 7 to 9 education, were unemployed. Finally, on considering the usual occupation for Inuit admissions by pre-arrest employment status, Baffin Correctional Centre, 1980, Table 8 reveals that 25 to 53.2% of those previously unemployed were classified as general labourers.

However, while the above enables us to obtain some measure of the characteristics of the Centre's profile, and should serve as a point of departure to ascertain their frequency in the population involved, northern demographic data was either not available or in the appropriate form to provide the needed basis for computation.

D. Institutional Population Trends

On consideration of the factors likely to affect institutional population trends in the Baffin, we also focussed on the high risk age category, 15 to 29, in our review of the population projections for the Baffin Region, 1978 to 1988. Specifically, on the basis of these projections (Statistics Section, GNWT, 1979), "while the natural growth of the high risk age category, 15 to 29, increased to 38.1% over a similar period, its distribution within the regional population remained relatively constant, representing 29.2% and 31.0% in 1978 and 1988, respectively" (Finkler, 1981, p. 92). While no significant increase in crime is envisaged within this

TABLE 5

NUMBER OF INUIT ADMISSIONS , BY AGE, BAFFIN CORRECTIONAL CENTRE, 1975-1980

Age on Admission	YEAR						Total	
	1975	1976	1977	1978	1979	1980	N	%
15			1	1			2	.7
16	1		5	1	1	5	13	4.7
17		4	4	4	3	2	17	6.2
18-20	4	9	15	19	13	25	85	30.8
21-24	6	7	13	9	4	16	55	19.9
25-29	10	12	8	3	8	11	52	18.8
30-34	1	3	4	3	1	11	23	8.3
35-39	1	1	2	1	3	3	11	4.0
40-44	3	1		1		2	7	2.5
45-49		2	1	1	1	2	7	2.5
50-59			1		1	2	4	1.5
GRAND TOTAL	26	39	54	43	35	79	276	99.9

TABLE 6

AGE ON ADMISSION FOR INUIT ADMISSIONS , BY LEVEL OF EDUCATION, BAFFIN CORRECTIONAL CENTRE, 1980

Age on Admission		Level of Education								
		Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	No Education
16				2	1	1	1			
17							1	1		
18-20					2	8	8	5	2	
21-24				7	2	2	3	1	1	
25-29			1	2			1	4	2	1
30-34		2	2				3	2		2
35-39						1			1	1
40-44							2			
45-49										2
50-59										2
GRAND TOTAL	N	2	3	11	5	12	19	13	6	8
	%	2.5	3.8	13.9	6.3	15.2	24.1	16.5	7.6	10.1

TABLE 7

LEVEL OF EDUCATION FOR INUIT ADMISSIONS , BY PRE-ARREST EMPLOYMENT STATUS, BAFFIN CORRECTIONAL CENTRE, 1980

Pre-Arrest Employment Status	Level of Education									Total	
	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	No Education	N	%
Full Time		1	2	1	3	2	2		4	15	19.0
Part Time	1	1	2				1	2		7	8.9
Seasonally					1	2				3	3.8
Periodically					1	3	2			6	7.6
Not at All	1	1	7	4	7	12	7	4	4	47	59.5
Unknown							1			1	1.3
GRAND TOTAL	2	3	11	5	12	19	13	6	8	79	100.1

TABLE 8

USUAL OCCUPATION FOR INUIT ADMISSIONS , BY PRE-ARREST EMPLOYMENT STATUS, BAFFIN CORRECTIONAL CENTRE, 1980

	Pre-Arrest Employment Status						Total	
Usual Occupation	Full Time	Part Time	Seasonally	Periodically	Not at All	Unknown	N	%
Trapper/Hunter/ Fisherman	1	2	1	1	6		11	13.9
Handicrafts	2	1			3		6	7.6
Service	3						3	3.8
General Labour	7	2	2	3	25	1	40	50.6
Trade/Technical		1		1	2		4	5.1
Clerical/Prof- essional	1	1					2	2.5
Student					3		3	3.8
No Skills	1			1	7		9	11.4
Other					1		1	1.3
GRAND TOTAL	15	7	3	6	47	1	79	100.0

group, the North may experience a similar trend predicted for southern Canada in regards to crime in the 1980's (Solicitor General, 1979), wherein the probable outcome of this age group's passage through "adult crime prone ages in the 1980's" will result in "continued increase in adult crime until the mid 1980's" (p. 35). Furthermore, "situations of accelerated and uncontrolled resource development within the region, with its migration of transient workers, predominantly within the high risk age group for potential anti-social behaviour, may place additional demands on the volume and range of institutional services" (Finkler, 1981, p. 93).

II. THE SIGNIFICANCE OF DEMOGRAPHIC DATA IN SOCIO-LEGAL POLICY

Throughout our discussion we have focussed on the utilization of northern demographic data in the measurement of criminality and offender profile as an element of criminological analysis during the course of our socio-legal research. In our opinion, the results of our efforts to correlate criminal statistics taking into account variation and change in the population involved as per its age, sex, ethnic, educational, employment and occupational structure has not been satisfactory. This can be attributed to the existing inappropriate format of demographic data for socio-legal analysis, the dated nature of census data, and unavailable information per specific characteristics.

For example, notwithstanding the failure of police statistics to differentiate between various population characteristics, the meaningful computation of the incidence of crime per standard population necessitates the availability of appropriate age categories by sex, ethnic origin, and community so that we may calculate a frequency of adult criminality excluding those under 16 or 18 years of age. Similarly, if we wish to calculate only the frequency of potential offenders or those with criminal responsibility, we require age distributions that enable us to exclude children.

With respect to the measurement of offender profile, we require information on ethnic origin by sex, age, and community over a comparative period of time. This is particularly important in regards to Métis population data, a group which has been over represented in admissions to correctional institutions, and who, until the 1979 Métis Census Project, were included in the Other category. Furthermore, toward the accurate construction of the offender profile information on marital status by ethnicity, age, sex, and community of the population involved, as well as distributions on education, employment and occupational status, better enables us to ascertain the criminal liability of specific groups.

Data on the above population characteristics have criminological significance and their availability is essential in determining the nature and range of population involvement in crime. Therefore, the inclusion of

demographic data in the measurement of crime and offender profile contributes to the requisite information for the formulation of socio-legal policy. Specifically, criminologists such as Wolfgang (1971) view such measurement as providing the "data for making rational decisions about methods of engineering a crime control system, and whether to focus resources of control at the beginning or end of a continuum of police-to-prison involvement of a population" (p. 130). Consequently, "it is necessary, for purposes of control and reduction, to know precisely the age, sex, ethnic, and other social attributes of the population that have a disproportionate share of involvement in crime" (Ibid.).

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Summary of Day I

Andrew Siggner

Regional and Social Economic Section
National Energy Board

The first day of the workshop was delayed as result of a change in airline schedule and did not begin until Monday afternoon, August 30, 1982. Consequently, only four of the six presentations were heard that day.

Kenneth de la Barre, workshop co-ordinator and Director of Finance and Administration at Katimavik, welcomed the participants and described the Committee on Northern Population Research's role, activities and membership. He encouraged the local participants to feel free to use the Committee as a vehicle to access northern demographic information and expertise as their need occurred.

Andy Therriault, District Manager for the Department of Indian Affairs and Northern Development in Frobisher Bay, welcomed the participants on behalf of Frobisher Bay and stated that he hoped the presentations and discussions would help eliminate some of the problems related to population issues facing the North and in particular the Baffin Region.

The chairperson of Day I, then made some introductory remarks in which he defined the study of demography as the study of population change through the basic demographic processes of fertility, mortality and migration. In order to explain why a population is changing the field of demography, he also examines the influence of other non-demographic factors such as social, economic, health and political conditions on the size, growth and characteristics of a population. An example of this type of relationship might be effects of major energy development project in the North influencing a regional area's population size, growth and characteristics (e.g. ethnic composition, age distribution, labour force composition, etc.) as a consequence of migration into that area.

However, the reverse of that relationship is also another type of demographic analysis, where the size of a population, its growth and characteristics influence or affect non-demographic factors or events. An example of that might be how the expected change in age composition of the Inuit

population will affect the size and location of school facilities, the demand for social services, housing, employment, etc. Therefore understanding how a population is changing can be a powerful planning tool for not only federal or territorial levels of government, but also for regional and community level planning.

These two approaches in demographic analysis form the framework or context in which the presentations at the workshop could be classified, notwithstanding that a number of presentations might examine population change from both perspectives, namely how it is influenced by and how it influences non-demographic events.

Bill Kemp's presentation focussed on the Inuit of Northern Québec who are claimants under the James Bay Agreement. He stated that until that Agreement the view of Inuit by the larger society was that they were subsistance hunters. However, the Inuit of Northern Québec have been engaged in a search for identity which includes not only the determination of their relationship with the land, but also to economic development, especially since the James Bay Agreement was signed.

This identity search has led to the raising of a couple of demographic issues which Kemp described as important to the Inuit's ability to understand who they are and where they see themselves in relation to the rest of society. One such question is, what is the desirable size for local communities and how does a community control population size? Does a large community mean an increased power base or is it better to remain small in size to be able to control more easily the community's direction.

Another important issue was the relationship of population size and growth to resource harvesting and consumption of country food. Kemp stated that in a study that has been conducted, country food consumption was on the order of three pounds per person per day. Improvements in the technology of hunting, such as the snowmobile, have permitted the Inuit to remain effective hunters despite two factors: 1) the rapid increase in their population and 2) the fact that they are no longer nomadic and their communities, for the most part, are in one permanent location.

Ignatius La Rusic in his presentation described how population size and family composition related to the terms and conditions of the James Bay Agreement involving the Cree Indians. He spoke of how the membership roll for the settlement of the Agreement was established, namely who was eligible. He described in some detail how the *bona fide* hunters and trappers received payment for remaining on the land. In other words, the Agreement recognizes hunting and trapping as an occupation and pays the Cree according to a complex formula based on their time spent on the land and the number of people in their family unit engaged in that activity.

La Rusic raised an important issue for planners and decision-makers, at least, with respect to native Indians. As land claims are settled, the way in which the claimants are registered for such purposes as the Indian Act may be challenged, if not underminded. Certain land claims may include native people who are not eligible to be registered under the Indian Act and the question for government departments responsible for deliverying programs and services under that Act is, how will they determine and plan to whom those programs will be delivered?

The presentation by Frances Abele raised fundamental concerns about social research in the North. The increase of energy development in the North, in particular, has given rise to the requirement for social impact assessments by the private sector and by governments. Such research studies are usually conducted by non-northerners who lack a cultural understanding of the North. Also, as many different actors are responsible for preparing social impact assessments, they often examine the same questions and develop similar data bases. However, this can lead to the conduct of short term studies which have a narrow focus and usually only provide a snapshot picture of the communities in question, compared to the more longitudinal type studies that academics and/or government may want to examine for policy and long-term planning development. Accordingly, Abele's organization, the Arctic Institute of North America, has established a "Native and Social Issues Program" which will encourage long-term northern and native issues to be identified and studied by northerners. In addition, one study which the Arctic Institute has identified is reviewing native employment training programs in the North over the last thirty years in terms of their implementation and impact on the trainees. The study itself will incorporate a training program for northern researchers.

However, this presentation led to an animated discussion in which local participants from Frobisher Bay raised some important issues. One such issue related to the quality of education that northerners had received in the post-war period. A local educator, Peter Baril, described how different generations of Inuit children had been educated over the last thirty years. He felt it is essential to maintain young children for their first eleven to twelve years in an environment which allowed them to acquire the basic structure of their mother tongue language. The Inuit children, who in the 1950s and early '60s were kept at home until they were twelve or thirteen and then sent to residential schools, had acquired the basics of Inuktitut. At the residential schools they had to learn English and that allowed this cohort of children to become absolutely fluent in both languages. According to Mr. Baril, these people make up the eloquent and able leadership of the Inuit today. In the mid to late 1960s, he stated that the education system in the North changed and children were put in schools earlier and learned English before they had a chance to acquire the basic language structure of Inuktitut and as a result have not learned either language well. This group or cohort is now entering the labour force. Baril claims they have had difficulties getting through the education system. Consequently as they come

to the labour market or into training programs they are not as successful as they could be, tracing their lack of success back to the issue of language development in the school system.

This problem appeared to be a very researchable one and if Baril's hypothesis is valid, it would have profound government policy and program implications relating to the young adult Inuit population, especially in the face of all sorts of economic development occurring in the North over the next five to ten years.

The last presentation of the day by Harold Finkler examined the role of demographic data in socio-legal research in the Northwest Territories. This study provided an excellent demonstration of how demographic data can be used to identify high risk populations related to crime. In his study, the demographic and socio-economic characteristics of offenders were derived from various records such as arrest records. From these records, incarceration rates and distributions by type of offence were related to the demographic characteristics of the offenders and trends in these rates could be examined over time. However, major data gaps were also identified. If they could be filled, decision-makers would have much better information on which to base decisions for such things as the location of a correctional centre, whether to expand existing ones, identifying high risk groups in order to reduce crime rates by delivering preventative programs.

The Population of the Far North: Early Results of the Census (1)

Edward T. Pryor and Pierre J. Hubert

Social Statistics Field
Census of Canada
Statistics Canada

The objective of this paper is to provide a brief overview of the population of the Far North (Alaska, Yukon Territory, Northwest Territories and Greenland), with a particular focus on the Canadian Far North (Yukon and Northwest Territories), triggered by the early results from the 1981 Census of Canada. These early results center on demography (age, sex, marital status), language and family-household characteristics.

We recognize that our definition of the Far North is arbitrary; however, analysis of the first results of the 1981 Census of Canada, while awaiting a more thorough geographic and demographic analyses of the northern populations with other data, are interesting.

The North has long remained a Canadian fascination. Robert M. Bone wrote over a decade ago: (2)

> "With the development of southern Canada now assured, the nation is taking a fresh look northwards. In recent years, national concern has been focussed upon arctic sovereignty, mineral development, and native peoples. A single project now under discussion, the Mackenzie Valley pipeline route, could shape the settlement patterns for years to come. Whether the nation will attempt to direct development and settlement more than at present is unclear. What is clear is that the current developments are setting the framework for future population patterns."

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(1) The authors want to express their appreciation to Ken Lane and Elizabeth Webber, Library, we well as M. Gratton and E. Coppock for the population pyramids. All are from Statistics Canada. Hans Oluf Hansen, University of Copenhagen, provided invaluable help on available data for Greenland. We also wish to thank Customer Services of Statistics Canada for providing the data base. Dwight Johnson, U.S. Bureau of the Census, was very helpful in providing Alaska figures. Of course, the authors are responsible for all conclusions herein.

(2) Robert M. Bone, "The Population of Northern Canada", in The North; Studies in Canadian Geography, University of Toronto Press, Toronto, 1972, pp. 91-92.

Other than the Mackenzie Valley pipeline, that remains a valid and still futuristic statement. Our interest in the North is based largely on unfulfilled promise and an assumed potential for development and for people.

Population

With a census in 1980 in the United States and Greenland and one in Canada in 1981, it is possible to examine northern growth in Alaska, Yukon, Northwest Territories and Greenland. Table 1 presents population figures for these areas for the past 30 years. Overall growth has been from 178 thousand to over one-half million (521 thousand). Alaska's share of this population has gone from 72.3% in 1950/1951 to 77.1% in 1980/1981. For the two Canadian Territories, the population growth has been slower, i.e. a combined population of 25 thousand in 1951 to almost 69 thousand in 1981. For both Territories, the slowing of growth in the latter part of the 1970s is apparent. The NWT population increased by 22.4% between 1971 and 1976 but only 7.4% between 1976 and 1981. The picture is similar for the Yukon with 18.8% (1971 to 1976) and 6.0% (1976 to 1981). The situation for Greenland during that period is similar.

With the exception of Alaska, the northern populations are tending to stabilize the prospects of zero growth increasing in the near future.

Native Peoples

Table 2 attempts to provide some indication of the native population trends over the past 30 years. Obviously, there is variation in what comprises "native" for Greenland, Canada and the United States. Despite this lack of precision, the aggregate gives one measure of what is happening to northern native groups.

In total, since 1950/1951, native peoples in these areas have gone from about 69,000 to 130,000 in 1980/1981, an increase of 88% over 30 years. In the two Canadian Territories, specifically, the growth of native population has doubled in 30 years. Table 3 provides a broad summary of native population as a proportion of total population. The general pattern is apparent: the proportion of native peoples to the total population is decreasing, from 39% in 1950/1951 to 25% in 1980/1981.

The Territories

In 1981, the Northwest Territories were divided into five regions versus four in 1976 and three in 1971. The Yukon was not subdivided into regions for any of these censuses.(3) Table 4 provides comparable 1976

(3) For more specific geographic detail for 1981, see publications E-569 and E-570, Census Divisions and Subdivisions, August 1982, Statistics Canada.

population based on 1981 region boundaries. Although all regions gained population, there were distinct differences between regions in growth, from 4.2% for the Inuvik Region to 17.6% in the Keewatin Region.

Traditionally, the age structure of the Territorial populations has varied considerably from the rest of Canada. The NWT continues to dramatically contrast to Canada in general (Table 5). In 1976, almost half (48.8%) of the population was under 20 years of age compared to 35.8% for the Provinces. Similar figures for 1981 were 45.9% (NWT) and 32.0% (Provinces). Because of higher mortality and migration, the Territories continue to show a low proportion of population 65 years of age and over. The Territories continued to be places for the young and those of labour force age. In fact, in both Territories the young labour force population (20-39) continued to grow between 1976 and 1981 both absolutely and as proportions of the population. Appendix B consists of a series of comparative population pyramids for the Territories and Canada which allow the reader to readily see the differences by age and sex and changes between 1971 and 1981.

Table 6 provides summary measures of family/household change for the NWT and the Yukon. Compared to Canada in general, the NWT shows higher than Canadian average figures on each of these measures. The results point to the necessity of detailed analysis of the family in the North especially in terms of ethnic differences.

Conclusion

This introductory presentation of Census results suggests several important issues for further study:

(1) Is the population of the Far North stabilizing?

(2) Will the population share for native peoples continue to decline in the 1980s?

(3) Is the Far North heading for increasing marital and family problems?

These and other issues, especially employment, are basic concerns. Language data(4) and more detailed information on other social characteristics, migration, labour force and income yet to be released from the 1981 Census of Canada, will assist considerably this analysis.

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(4) See Appendix C for 1976 and 1981 data for Canada and the Territories by Mother Tongue. With the 1981 Census, more detailed breakdowns of specific Native Indian languages have been provided.

List of Attachments

Table 1: Population of the Far North, Selected Years, for Alaska, Greenland, NWT and Yukon.

Table 2: Native Peoples Population of the Far North, Selected Years, for Alaska, Greenland, NWT and Yukon.

Table 3: Native Peoples as Proportion of Total Population, Census Years, for Alaska, Greenland, NWT and Yukon.

Table 4: Population of the NWT and Yukon by 1981 Region Boundaries, 1981 and 1976.

Table 5: Age Structure, 1976 and 1981, Canada, the NWT and Yukon.

Table 6: Selected Family/Household Characteristics of the Yukon, NWT (by Region) and Canada, 1981 and 1976.

Appendix A: The 1981 Census of Canada: Notes Relevant to Northern Areas.

Appendix B: Population Age Pyramids for Canada, NWT and Yukon.

Appendix C: Selected Mother Tongues, 1981 and 1976.

Appendix D: General Population, Housing, Household, Family and Labour Force Data, 1976 Census of Canada (on 1981 Census boundaries), NWT and Yukon.

Appendix E: References

TABLE 1

Population(1) of the Far North, Selected Years, for Alaska, Greenland, the Northwest Territories, and the Yukon

Year	Alaska	Greenland	NWT	Yukon	TOTAL
1950	128,643	-	-	-	177,902
1951	-	24,159	16,004	9,096	
1955	-	27,101	-	-	-
1956	-	-	19,313	12,190	
1960	226,167	33,140	-	-	296,933
1961	-	-	22,998	14,628	
1965	-	39,613	-	-	-
1966	-	-	28,738	14,382	
1970	302,583	46,532	-	-	402,310
1971	-	-	34,807	18,388	
1976	-	49,630	42,609	21,836	-
1980	401,851	-	-	-	521,388
1981	-	50,643	45,741	23,153	

SOURCES: U.S. Bureau of the Census, *Historical Statistics of the United States Colonial Times to 1957; Continuation to 1962 and Revisions*, 1965; U.S. Bureau of the Census, *World Population 1979*, 1980; *Historical Statistics of Canada*, MacMillan Co., Toronto, 1965; Statistics Canada, *Canada Year Book, 1978-79*, 1978; Hans O. Hansen, "From Natural to Controlled Fertility", in *Natural Fertility*, H. Leridon and J. Menken (eds.), 1979; *Grønlands befolkning*, Danmarks Statistik, 1982.

(1) Population counts are *de jure*.

TABLE 2

Native Peoples Population of the Far North, Selected Years, for Alaska, Greenland, the Northwest Territories, and the Yukon

	ALASKA				GREENLAND	NORTHWEST TERRITORIES			YUKON			TOTAL NATIVE POPULATION
Year	Total Native Population	Eskimo	Indian	Aleut	Total Native Population (2)	Total Native Population	Inuit	Status (4) Indian	Total Native Population	Inuit	Status Indian (4)	
1950	33,863	15,882	14,089	3,892	-	-	-	-	-	-	-	68,976
1951	-	-	-	-	22,890	10,660	6,822	3,838	1,563	30	1,533	
1960	42,522	22,323	14,444	5,755	30,378	-	-	-	-	-	-	88,340
1961	-	-	-	-	-	13,233	7,977	5,256	2,207	40	2,167	
1970	50,819	28,186	16,281	6,352	38,912	-	-	-	-	-	-	110,901
1971	-	-	-	-	-	18,580	11,400	7,180	2,590	10	2,580	
1980	64,047 (1)	34,135 (1)	21,849 (1)	8,063 (1)	-	-	-	-	-	-	-	130,245
1981	-	-	-	-	41,459	22,039	15,539 (3)	6,500 (5)	2,700	100 (5)	2,600 (5)	

(1) Provisional figures.

(2) For 1951, defined as "Persons under Danish law"; from 1955 on, defined as "Persons born in Greenland".

(3) Estimate, Government of the Northwest Territories, for June 1981.

(4) For the first time, the Census of Canada in 1981 will count the Metis and Non-Status Indian population. These figures are not yet available and estimates are not included here for 1981 or previous periods.

(5) Estimate. Final 1981 Census ethnicity figures not yet available.

SOURCE: Census of Population, U.S. Bureau of the Census; Census of Canada, Statistics Canada; Hansen, <u>op</u>. <u>cit</u>.; Danmarks Statistik.

TABLE 3

Native Peoples as Proportion of Total Population, Census Years, for Alaska, Greenland, the Northwest Territories, and the Yukon

(percent)

Year	Alaska	Greenland	Northwest Territories	Yukon	TOTAL
1950	26.3	-	-	-	38.8
1951	-	94.7	66.6	17.2	
1960	18.8	-	-	-	29.8
1961	-	91.7	57.5	15.1	
1970	16.8	83.6	-	-	27.6
1971	-	-	53.4	14.1	
1980	15.9	-	-	-	25.0
1981	-	81.9	48.2 (1)	11.7 (1)	

(1) Based on estimate of native peoples population.

TABLE 4

Population of the Northwest Territories and Yukon
by 1981 Region Boundaries, 1981 and 1976

Territory and Regions	1981		1976	
	Population	%	Population	%
Northwest Territories	45,741	100.0	42,609	100.0
Baffin Region	8,300	18.1	7,480	17.6
Central Arctic Region	3,245	7.1	2,871	6.7
Fort Smith Region	22,384	48.9	21,397	50.2
Inuvik Region	7,485	16.4	7,183	16.9
Keewatin Region	4,327	9.5	3,678	8.6
Yukon	23,153	-	21,836	-

SOURCE: Census of Canada

TABLE 5

Age Structure, 1976 and 1981, Canada, the Northwest Territories and the Yukon

(percent)

Age Group	CANADA (1)		YUKON		NORTHWEST TERRITORIES	
	1981	1976	1981	1976	1981	1976
< 5	7.3	7.5	9.1	9.5	12.1	13.0
5- 9	7.3	8.2	8.5	9.6	11.1	13.2
10-14	7.9	9.9	8.7	10.3	11.6	12.4
15-19	9.5	10.2	9.6	9.9	11.1	10.2
20-24	9.6	9.3	10.2	10.8	10.3	10.2
25-29	8.9	8.7	12.1	12.0	10.5	10.2
30-34	8.4	7.1	11.3	9.3	8.9	7.3
35-39	6.7	5.8	8.1	6.6	6.0	5.6
40-44	5.5	5.5	5.7	5.5	4.7	4.9
45-49	5.2	5.5	4.4	4.8	3.9	3.8
50-54	5.1	5.3	3.9	4.1	3.1	2.9
55-59	4.9	4.4	3.1	2.7	2.4	2.2
60-64	4.0	3.9	2.1	2.1	1.5	1.5
65-69	3.5	3.1	1.4	1.2	1.1	1.2
70-74	2.6	2.3	.9	.8	.8	.7
75 +	3.6	3.3	.9	.8	.9	.8
TOTAL (%)	100.0	100.0	100.0	100.0	100.0	100.1

(1) Excluding the Yukon and Northwest Territories.

Source: Census of Canada

TABLE 6

Selected Family/Household Characteristics of the Yukon, NWT (by Region) and Canada, 1981 and 1976

CHARACTERISTICS	YUKON		NORTHWEST TERRITORIES												CANADA	
	TOTAL		TOTAL		BAFFIN		CENTRAL ARCTIC		FORT SMITH		INUVIK		KEEWATIN		TOTAL	
	1981	1976	1981	1976	1981	1976	1981	1976	1981	1976	1981	1976	1981	1976	1981	1976
AVERAGE NUMBER OF PERSONS PER PRIVATE HOUSEHOLD	2.9	3.2	3.8	4.1	4.7	4.9	4.6	5.0	3.3	3.6	3.8	4.1	4.8	5.2	2.9	3.1
AVERAGE NUMBER OF PERSONS PER FAMILY	3.3	3.5	4.0	4.3	4.6	4.9	4.6	4.7	3.6	3.9	4.0	4.3	4.8	5.2	3.3	3.5
AVERAGE NUMBER OF CHILDREN PER FAMILY	1.4	1.6	2.2	2.4	2.8	3.0	2.7	2.8	1.8	2.0	2.2	2.4	3.0	3.3	1.4	1.6
PERCENT OF FAMILIES WITH ONE PARENT ONLY	12.4	10.0	13.3	11.3	13.2	13.0	12.7	13.0	11.8	9.8	17.5	12.4	15.0	13.8	11.3	9.8

SOURCE: Census of Canada

APPENDIX A

THE 1981 CENSUS OF CANADA:

Notes Relevant to Northern Areas

For most Canadians, the Census was taken on 3 June 1981. However, large parts of the NWT and Yukon were enumerated several weeks prior to this date. This early enumeration was necessary in order to reach winter settlements before their populations disperse for the summer. Also, many very remote settlements are the most accessible by aircraft during the months of April and May.

The enumeration of northern Canada requires specific activities in order to assure the highest coverage of the population possible. In terms of special publicity, the 1981 Census made considerable use of CBC Northern Network, newspapers transmitted and printed in English, French and Native languages, and other means especially geared to the North. The fundamental theme of this publicity was to emphasize the importance of the Census for local residents, to show the changes taking place in the North, and how the Census helps plan for the future and its use for allocating government expenditures.

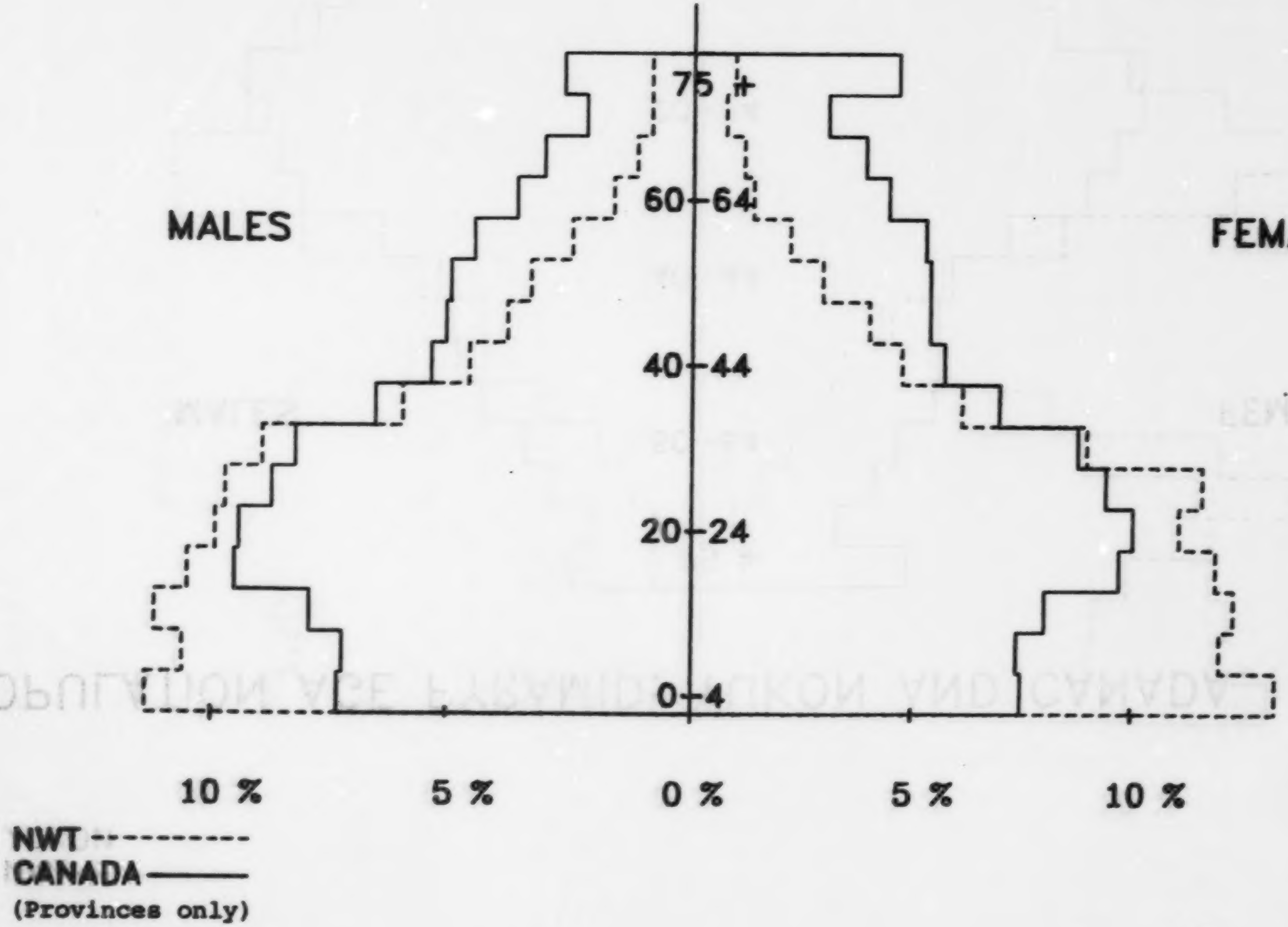
The final population counts were released on March 30, 1982. The dissemination program from the 1981 Census will include publications, users summary tapes, microfiches and custom tabulations. The publication program will consist of four series, that is, the National Series, the Provincial/Territorial Series, the Profile Series, and the Analytical/Reference Series. Beyond the publication program, a series of over five hundred tables will be produced on microfiche and computer tapes (User Summary Tapes). Both microfiche and User Summary Tapes contain the same subject matter content. In addition, and of special interest to northern researchers, a special Native Peoples Summary Tape will be produced for the first time. Lastly, custom tabulations for cross tabulations not found in the planned product line can be generated for standard or custom areas.

Users requiring more information on Statistics Canada's products from the census can obtain a free copy of "Products and Services of the 1981 Census of Canada" by writing directly to: Publications Sales and Services, Statistics Canada, Ottawa, Ontario K1A 0V7, or by contacting one of Statistics Canada Regional Offices across the country. (Toll free access is provided in all Provinces and Territories for users that reside outside the local dialing area). Regional Offices are located in St. John's, Halifax, Montreal, Toronto, Winnipeg, Regina, Edmonton, and Vancouver.

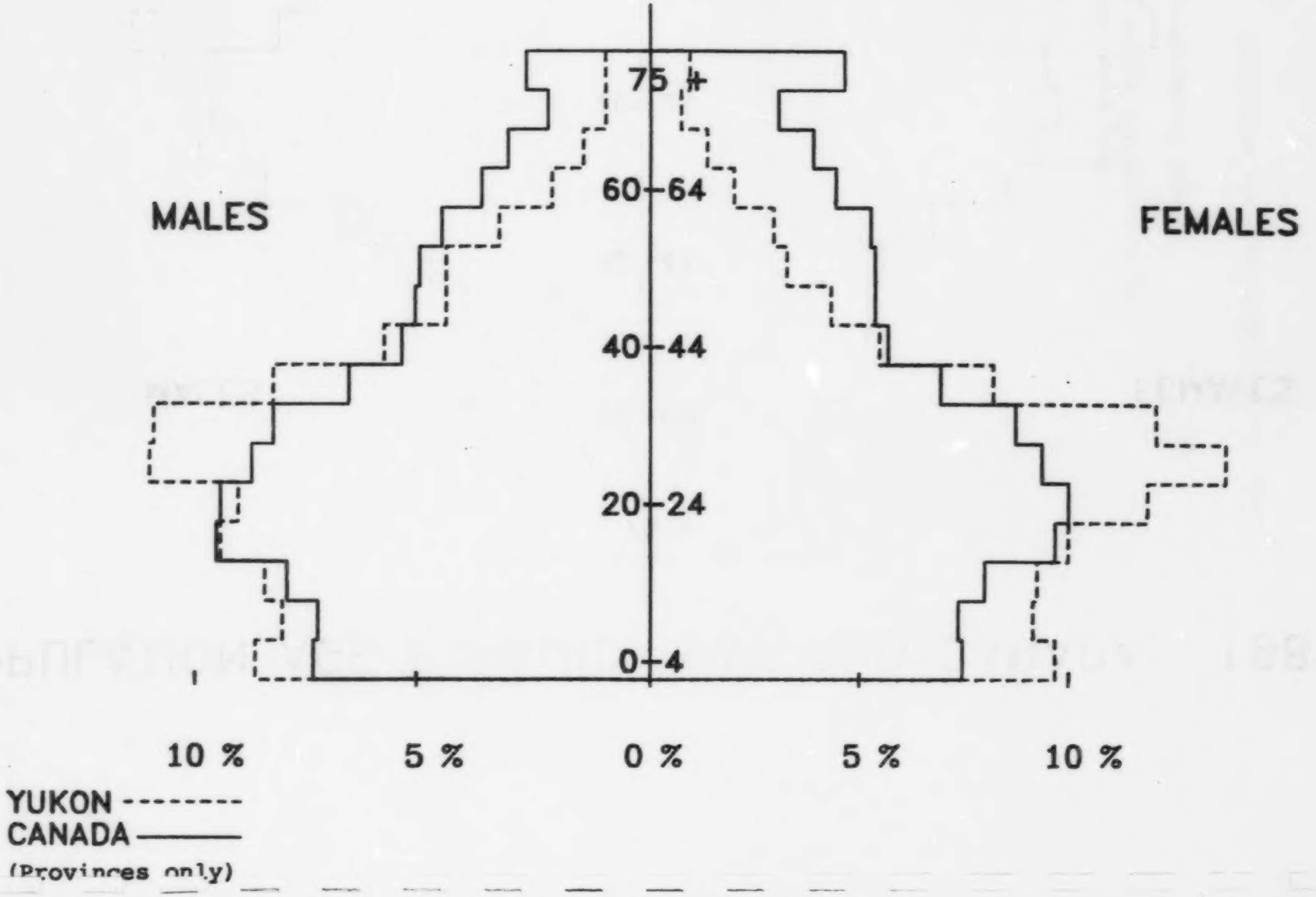
The related toll-free numbers are as follows:

Newfoundland and Labrador	Zenith 0-7037
Nova Scotia, New Brunswick and Prince Edward Island	1-800-565-7192
Québec	1-800-361-2831
Ontario	1-800-268-1151
Manitoba	1-800-282-8006
Saskatchewan	1(112)-800-667-3524
Alberta	1-800-222-6400
British Columbia	112-800-663-1551
Yukon and Northern British Columbia	Zenith 0-8913
Northwest Territories	Zenith 2-2015

POPULATION AGE PYRAMID: NWT AND CANADA, 1981



POPULATION AGE PYRAMID: YUKON AND CANADA, 1981



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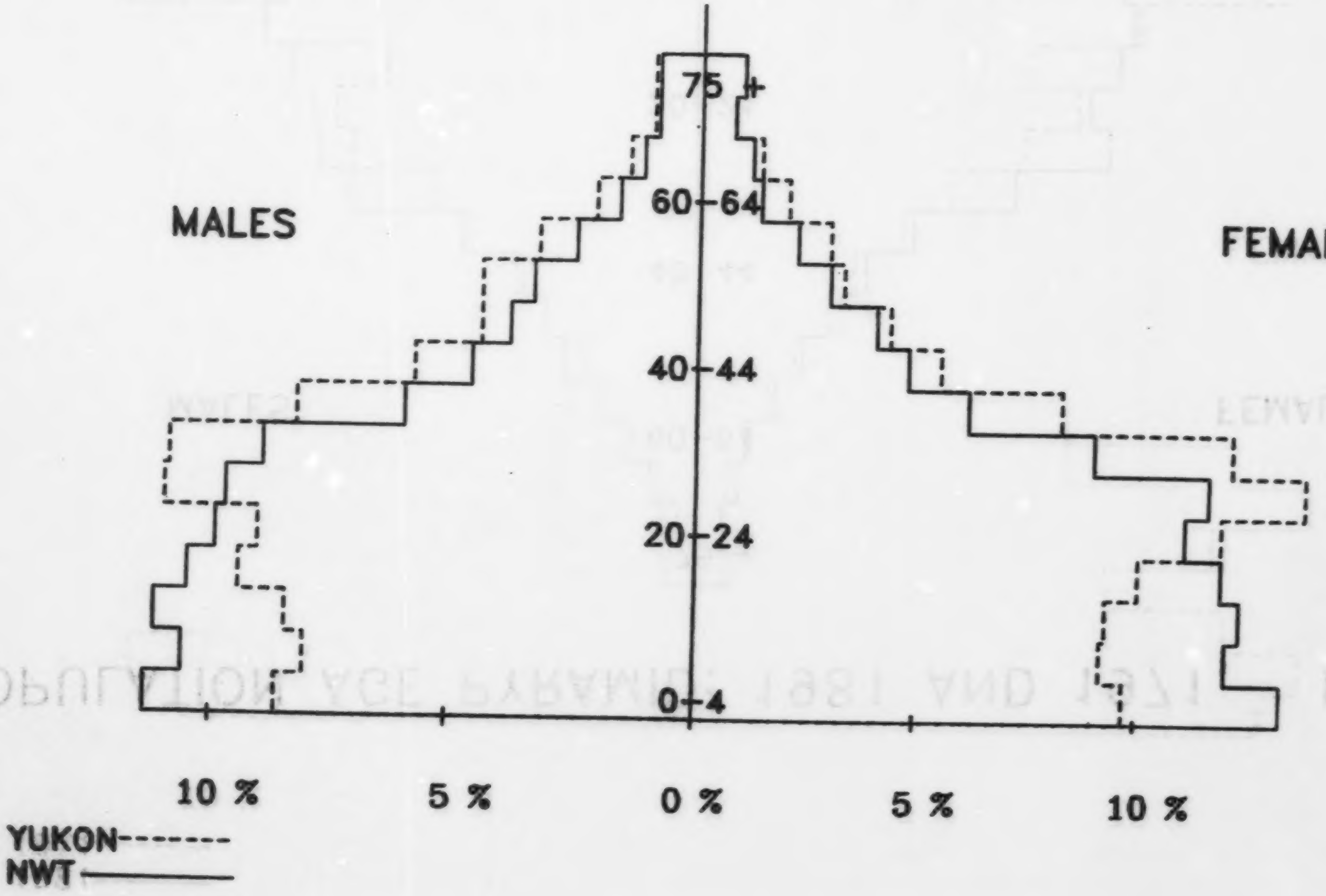
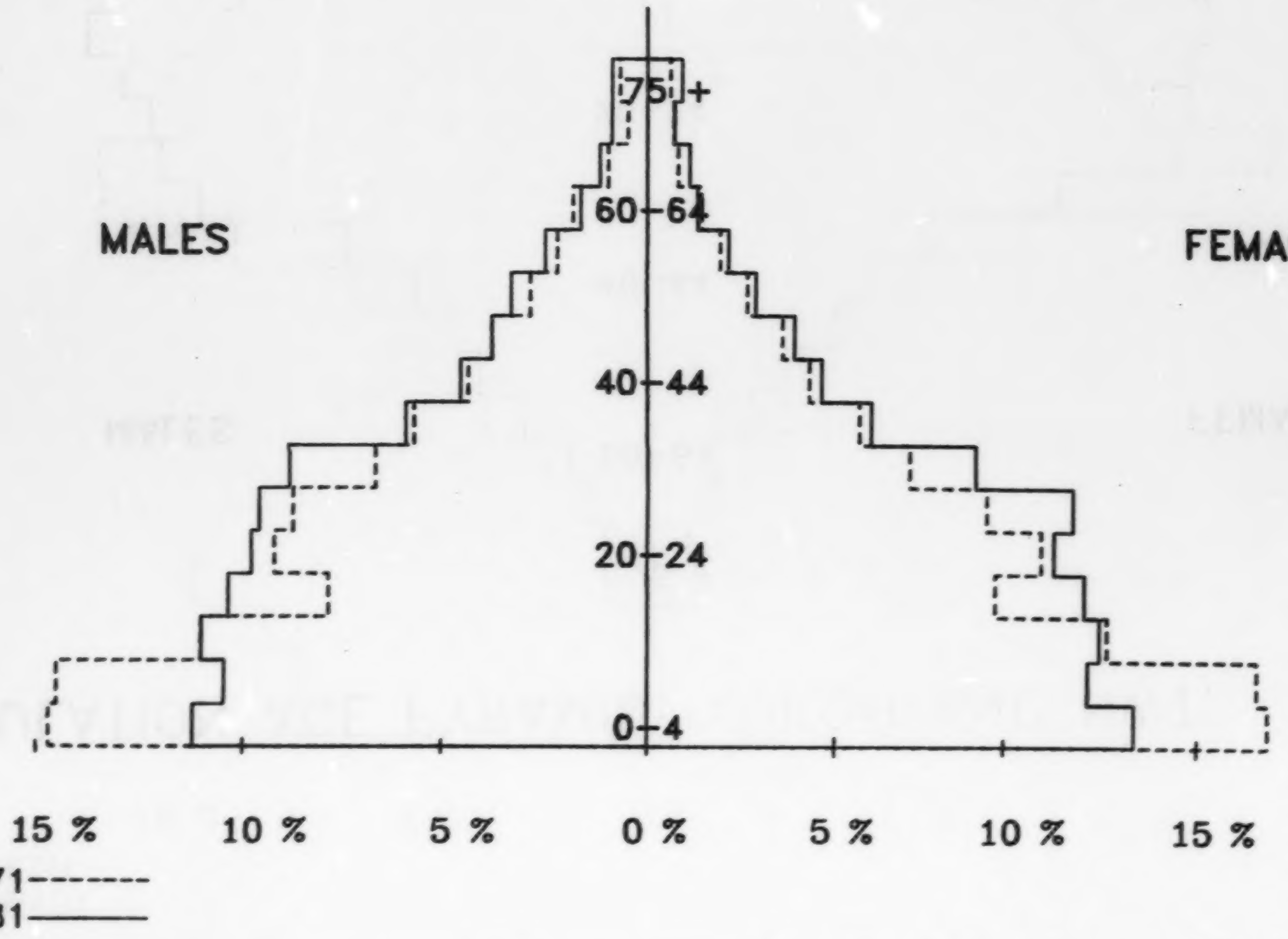
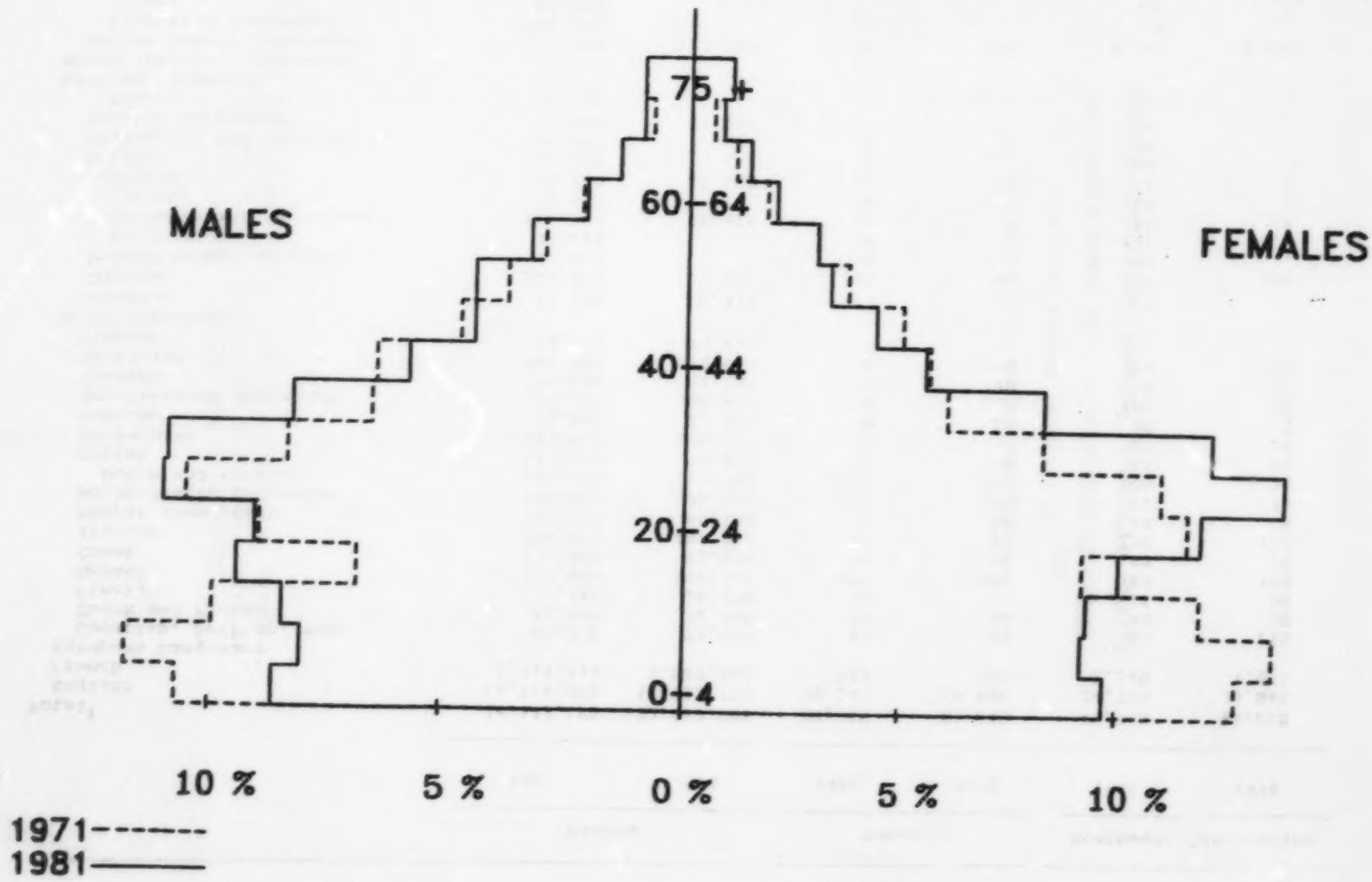


POPULATION AGE PYRAMID: 1981 AND 1971, NWT



POPULATION AGE PYRAMID: 1981 AND 1971, YUKON



Selected Mother Tongues, Canada, Yukon and Northwest Territories, 1981 and 1976

	Canada		Yukon		Northwest Territories	
	1981	1976	1981	1976	1981	1976
Total[1]	24,343,180	22,992,605	23,155	21,840	45,745	42,610
English	14,918,445	14,122,770	20,245	18,940	24,755	23,085
French	6,249,095	5,887,205	580	525	1,240	1,095
European Languages						
Croatian, Serbian, etc.	87,870	77,575	45	55	65	155
Czech and Slovak	42,825	34,955	50	30	40	30
Finnish	33,380	28,470	15	-	15	30
German	522,855	476,715	495	405	385	365
Greek	122,960	91,530	15	10	45	35
Italian	528,775	484,050	45	45	130	135
Magyar (Hungarian)	83,720	69,300	80	50	40	35
Netherlandic Languages	156,640	122,555	115	100	110	75
Dutch and Frisian	146,830	114,760	110	100	105	70
Polish	127,960	99,845	35	20	45	40
Portuguese	165,510	126,535	5	-	25	25
Russian	31,490	23,485	20	10	20	5
Scandinavian Languages	67,725	59,410	110	110	100	70
Spanish	70,160	44,135	35	30	35	15
Ukrainian	292,265	282,060	170	140	210	195
Yiddish	32,760	23,435	5	-	-	-
Asian Languages						
Armenian	17,140	10,335	-	-	5	-
Chinese	224,030	132,560	125	45	145	120
Indo-Chinese Languages	41,615	..	30	..	35	..
Vietnamese	30,105	..	30	..	35	..
Indo-Pakistani Languages	116,990	58,415	35	5	45	15
Punjabi	53,680	..	20	..	10	..
Japanese	20,130	15,525	15	10	5	5
Korean	17,100	..	10	..	10	..
Philippino and Tagalog	44,865	..	5	..	70	..
Semitic Languages	58,900	37,100	-	-	10	15
Arabic	50,115	..	-	..	10	..
African Languages	3,270	..	-	..	-	..
North American Languages						
Native Indian Languages	127,450	117,105	370	505	4,360	4,140
Algonkian Languages	102,905	..	15	..	270	..
Cree	67,495	..	10	..	155	..
Ojibway	19,770	..	5	..	110	..
Athapaskan Languages	11,665	..	225	..	4,090	..
Inuktitut	18,840	15,900	10	5	13,200	11,835
Indian, not otherwise specified	20,285	..	455	..	530	..
Not Stated	...	445,020	...	745	...	1,435

...not applicable
..not available
-nil or zero

[1] Due to space constraints, some smaller languages groups are not shown in this table. This, combined with random rounding, means that the categories shown will not sum to the totals.

GENERAL POPULATION, HOUSING, HOUSEHOLD, FAMILY AND LABOUR FORCE DATA, 1976 CENSUS OF CANADA (on 1981 Census boundaries) [(a)]

Northwest Territories and Yukon

(a) For comparison of general population, housing, household and family data with 1981, refer to bulletins E-569 (Yukon) and E-570 (NWT).

GENERAL POPULATION,HOUSING,HOUSEHOLD,FAMILY AND LABOUR FORCE DATA
CENSUS OF CANADA, 1976

CHARACTERISTICS	BAFFIN REGION	CENTRAL ARCTIC REGION	FORT SMITH REGION	INUVIK	KEEWATIN REGION	NORTH WEST TERRITORIES	YUKON
POPULATION, 1976	7,480	2,912	21,356	7,183	3,678	42,609	21,836
SEX AND AGE GROUP:							
MALE, TOTAL	3,920	1,510	11,410	3,735	1,875	22,450	11,705
0- 4 YEARS	580	205	1,270	450	305	2,810	1,085
5- 9 "	630	235	1,245	470	330	2,910	1,115
10-14 "	505	210	1,235	480	280	2,710	1,155
15-19 "	385	155	1,165	350	180	2,245	1,130
20-24 "	350	120	1,255	385	140	2,235	1,185
25-34 "	615	205	2,170	725	270	3,985	2,480
35-44 "	410	155	1,320	415	150	2,450	1,500
45-54 "	235	105	930	205	120	1,580	1,080
55-64 "	140	70	500	140	85	910	610
65-69 "	40	25	135	45	20	265	185
70 AND OVER	20	30	185	80	10	330	205
FEMALE, TOTAL	3,560	1,405	9,945	3,450	1,800	20,180	10,130
0- 4 YEARS	540	225	1,175	465	310	2,715	995
5- 9 "	600	225	1,160	415	310	2,715	980
10-14 "	495	220	1,145	460	255	2,575	1,095
15-19 "	365	150	1,040	375	170	2,180	1,040
20-24 "	315	125	1,180	335	140	2,080	1,180
25-34 "	550	185	1,860	625	285	3,480	2,180
35-44 "	330	135	1,070	330	165	2,025	1,135
45-54 "	200	70	690	210	85	1,260	840
55-64 "	95	45	355	110	60	665	430
65-69 "	30	20	110	50	15	225	105
70 AND OVER	25	15	175	70	20	315	155
MARITAL STATUS:							
SINGLE (NEVER MARRIED), TOTAL	4,735	1,800	11,860	4,330	2,380	25,215	11,245
SINGLE (NEVER MARRIED), 15 YEARS AND OVER	1,375	480	4,750	1,585	580	8,775	4,820
MARRIED	2,535	1,040	8,785	2,660	1,180	16,205	9,815
WIDOWED	185	85	365	145	90	825	405
DIVORCED	50	15	245	50	10	370	370
MOTHER TONGUE:							
ENGLISH	1,080	815	15,605	5,165	415	23,080	18,940
FRENCH	195	15	720	150	15	1,095	525
GERMAN	35	10	275	35	5	380	405
ITALIAN	5	-	125	-	-	135	40
UKRAINIAN	5	5	155	20	5	185	135
OTHER	5,990	2,000	3,615	1,615	3,085	16,300	1,045
NOT STATED	175	65	855	190	150	1,435	745
OCCUPIED PRIVATE DWELLINGS, TOTAL	1,480	555	5,600	1,690	700	10,020	6,495
OWNED	85	25	2,020	360	15	2,505	3,200
RENTED	1,400	525	3,580	1,325	680	7,515	3,300
SINGLE-DETACHED	1,060	500	2,840	1,015	650	6,075	3,425
SINGLE-ATTACHED	200	30	475	365	35	1,105	925
APARTMENT	185	20	1,250	210	10	1,685	1,065
DUPLEX	5	-	55	15	-	75	185
MOVABLE	15	-	980	80	5	1,080	805
PRIVATE HOUSEHOLDS, TOTAL	1,480	550	5,600	1,690	700	10,015	6,495
BY NUMBER OF PERSONS:							
1	200	55	885	255	70	1,475	1,160
2	185	60	1,105	305	80	1,715	1,655
3	170	65	1,010	240	85	1,570	1,130
4-5	335	140	1,695	460	185	2,830	1,805
6-9	485	195	740	335	250	2,010	600
10 OR MORE	100	35	145	90	40	415	45
AVERAGE PERSONS PER PRIVATE HOUSEHOLD	4.9	5.0	3.6	4.1	5.2	4.1	3.2
FAMILY PERSONS IN PRIVATE HOUSEHOLDS	6,570	2,545	17,580	6,080	3,385	36,175	17,415
NON-FAMILY PERSONS IN PRIVATE HOUSEHOLDS	845	225	2,725	890	225	4,715	3,230
BY NUMBER OF FAMILIES:							
0	235	70	1,245	340	90	2,000	1,845
1	1,115	430	4,240	1,295	575	7,650	4,780
2 OR MORE	115	55	115	50	40	375	75
FAMILIES, TOTAL	1,350	545	4,475	1,410	650	8,425	4,830
HUSBAND-WIFE FAMILIES	1,185	470	4,035	1,230	565	7,470	4,430
LONE PARENT FAMILIES	175	70	440	170	90	955	500
BY NUMBER OF CHILDREN:							
0	175	65	945	245	55	1,475	1,385
1	240	100	1,050	305	110	1,810	1,145
2	240	100	1,160	315	120	1,930	1,205
3-4	335	150	930	325	175	1,820	855
5 OR MORE	350	120	400	220	190	1,285	225
CHILDREN IN FAMILIES BY AGE:							
UNDER 6 YEARS	1,275	485	2,785	990	715	6,250	2,385
6-14	1,820	760	4,010	1,495	1,025	9,210	3,655
15-17	400	155	1,115	390	225	2,285	1,100
18-24	365	110	910	355	170	1,915	770
25 AND OVER	85	25	260	210	35	615	140
AVERAGE NUMBER OF PERSONS PER FAMILY	4.9	4.7	3.9	4.3	5.2	4.3	3.5
AVERAGE NUMBER OF CHILDREN PER FAMILY	3.0	2.8	2.0	2.4	3.3	2.4	1.6
NUMBER OF PERSONS IN FAMILIES	6,570	2,545	17,580	6,080	3,385	36,175	17,415

GENERAL POPULATION,HOUSING,HOUSEHOLD,FAMILY AND LABOUR FORCE DATA
CENSUS OF CANADA, 1976

CHARACTERISTICS	BAFFIN REGION	CENTRAL ARCTIC REGION	FORT SMITH REGION	INUVIK	KEEWATIN REGION	NORTH WEST TERRITORIES	YUKON
MOBILITY STATUS:							
POPULATION 5 YEARS AND OVER	6,355	2,485	18,910	6,280	3,060	37,065	18,745
NON-MOVERS	2,830	1,205	6,570	2,400	1,475	14,480	5,910
MOVERS	3,530	1,275	12,345	3,850	1,585	22,585	13,840
NON-MIGRANTS	2,135	820	3,785	1,520	880	9,250	5,240
MIGRANTS	1,385	455	8,550	2,330	605	13,335	8,595
FROM SAME CENSUS DIVISION	275	75	1,130	330	100	1,920	1,210
FROM SAME PROVINCE	375	180	1,595	610	210	2,870	1,280
DIFFERENT CD	70	95	415	275	110	960	-
CD NOT STATED	25	15	50	10	-	95	70
FROM DIFFERENT PROVINCE	805	220	6,105	1,485	305	8,930	6,305
FROM OUTSIDE CANADA	105	20	540	140	25	830	685
PROVINCE OF RESIDENCE (1971) NOT STATED	110	30	300	85	70	605	330
POPULATION 15 YEARS AND OVER	4,120	1,800	14,140	4,435	1,880	26,175	15,410
MALE	2,200	865	7,665	2,335	955	14,015	8,355
FEMALE	1,820	735	6,480	2,105	920	12,155	7,080
EDUCATION:							
MALE							
LESS THAN GRADE 5	885	380	855	425	360	2,810	400
GRADES 5- 8	385	175	1,115	480	215	2,400	1,105
GRADES 9-10	215	70	1,220	375	130	2,010	1,615
GRADES 11-13	180	70	1,400	445	80	2,130	1,945
POST-SECONDARY NON UNIVERSITY	305	85	1,555	315	90	2,350	1,730
SOME UNIVERSITY	135	45	800	170	55	1,205	935
WITH POST-SECONDARY NON-UNIVERSITY	65	20	345	60	20	520	385
WITHOUT POST-SECONDARY NON-UNIVERSITY	65	25	455	110	25	685	540
UNIVERSITY DEGREE	125	30	710	120	25	1,010	610
FEMALE							
LESS THAN GRADE 5(3)	860	355	720	430	410	2,770	310
GRADES 5- 8	425	180	940	470	225	2,250	755
GRADES 9-10	145	50	1,065	375	105	1,745	1,330
GRADES 11-13	135	35	1,405	345	80	1,880	1,800
POST-SECONDARY NON-UNIVERSITY	185	50	1,285	260	55	1,845	1,620
SOME UNIVERSITY	80	35	710	145	35	1,010	885
WITH POST-SECONDARY NON-UNIVERSITY	45	25	370	70	15	530	390
WITHOUT POST-SECONDARY NON-UNIVERSITY	40	15	335	75	20	485	475
UNIVERSITY DEGREE	70	20	360	75	25	930	375
LABOUR FORCE:							
MALES IN LABOUR FORCE	1,755	540	6,140	1,735	720	10,885	8,805
PARTICIPATION RATE	78.8	61.8	80.2	74.3	75.0	77.6	81.6
15-19 YEARS OF AGE	220	60	635	155	85	1,150	855
UNEMPLOYMENT RATE	6.8	8.3	11.0	12.9	17.6	10.4	20.6
20-24 YEARS OF AGE	285	85	1,080	295	115	1,875	1,015
UNEMPLOYMENT RATE	5.1	-	7.3	5.1	4.3	6.4	14.3
25-34 YEARS OF AGE	555	165	1,945	615	235	3,520	2,250
35-44 " " "	385	110	1,195	355	125	2,155	1,360
45-54 " " "	200	75	785	170	100	1,335	870
55-64 " " "	85	25	400	100	40	880	465
65 AND OVER	30	15	85	40	10	180	110
EMPLOYED	1,700	520	5,845	1,650	680	10,400	8,180
UNEMPLOYED	60	15	295	85	35	480	630
UNEMPLOYMENT RATE	3.4	2.8	4.8	4.9	4.9	4.5	8.3
FEMALES IN LABOUR FORCE	880	255	3,530	1,000	405	6,075	4,140
PARTICIPATION RATE	46.4	34.7	54.5	47.5	44.6	50.0	58.8
15-19 YEARS OF AGE	125	30	485	115	55	815	575
UNEMPLOYMENT RATE	12.0	16.7	14.4	17.4	9.1	14.7	18.3
20-24 YEARS OF AGE	175	65	775	195	70	1,280	810
UNEMPLOYMENT RATE	5.7	7.7	7.7	7.7	7.1	7.0	16.7
25-34 YEARS OF AGE	290	80	1,070	350	140	1,835	1,270
35-44 " " "	150	40	590	175	70	1,020	740
45-54 " " "	100	25	375	100	35	825	510
55-64 " " "	35	5	185	40	25	285	210
65 AND OVER	10	10	45	25	10	100	30
EMPLOYED	845	240	3,295	830	375	5,880	3,850
UNEMPLOYED	45	10	235	65	30	385	485
UNEMPLOYMENT RATE	5.1	3.8	6.7	6.5	7.4	6.3	12.0
LABOUR FORCE ACTIVITY OF FAMILIES:							
HUSBANDS, TOTAL	1,170	470	4,035	1,235	580	7,470	4,400
PARTICIPATION RATE	85.9	68.1	88.0	83.4	84.8	85.4	88.9
UNEMPLOYMENT RATE	2.0	1.6	2.4	3.4	2.1	2.6	5.1
WIVES, TOTAL	1,170	470	4,035	1,230	580	7,470	4,400
PARTICIPATION RATE	41.9	33.0	50.2	48.0	42.0	46.9	54.2
UNEMPLOYMENT RATE	5.1	3.2	5.7	5.8	6.5	5.7	10.3
FEMALE LONE PARENT, TOTAL	120	40	330	130	60	685	380
PARTICIPATION RATE	54.2	25.0	65.2	50.0	50.0	54.7	65.8
UNEMPLOYMENT RATE	-	-	7.0	7.7	16.7	5.3	14.0
MALE LONE PARENT, TOTAL	55	35	115	40	25	270	120
PARTICIPATION RATE	72.7	42.9	73.9	75.0	80.0	88.5	83.3
UNEMPLOYMENT RATE	12.5	-	5.9	-	25.0	5.4	10.0

APPENDIX E

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Some Aspects of Recent Infant and Adult Mortality in Greenland

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1. Introduction

This paper summarizes some aspects of a study on recent Danish and Greenlandic infant mortality on cohort basis (Hansen 1982a). We also give period estimates of Greenlandic age-specific death intensities between age five and age seventy for certain causes of death. The infant mortality estimates refer to cohorts born in Greenland between 1969 and 1977 of mothers born in Greenland, and to the generations born in Denmark between 1976 and 1977. The considered aspects of Greenlandic adult mortality relate to the period 1968 to 1980. For the sake of comparison we occasionally include estimates of Danish adult mortality for the year 1980.

2. Data

The infant data are differentiated by sex and consist of official birth statistics and individual dates of birth and death extracted from death certificates. We also have the detailed WHO-code of underlying cause of death for any deceased person (see Appendix 1). Due to smallness of numbers and for the sake of international comparison the death diagnoses of the infants will be based on the International B-List including fifty items. The following diagnoses are considered: pneumonia, congenital malformations, birth injuries, other perinatal mortality, ill-defined conditions, accidents, all other causes of death (residue), and all causes of death. For further details concerning the infant data, cf. Hansen (1982a-b).

The Greenlandic data on adult death are available as unpublished official statistics from the Danish Central Bureau of Statistics (Danmarks Statistik). The annual deaths are available as aggregates by five year age group and B-code classification of cause of death. Between 1968 and 1974 the statistics embrace all Greenlandic deaths no matter where the birth place was located. Since 1975, the unpublished official death statistics have been differentiated by birth place (inside/outside Greenland).

Up to 1974, the annual number of deaths with missing death diagnoses were reported without indication of age in the official statistics. Since 1975, this information has been specified by age. From the Central Bureau of Statistics we also obtained unpublished annual distributions of the Greenland-born population by sex and age on 1st January 1968 through 1980. We studied the following diagnose groups: death caused by motor vehicle accidents (B47), death due to all other types of accidents (B48), suicide (B49), death due to all other external causes (in particular homicide) (B50), death no matter cause, death due to external causes (B47 through B50), death due to internal causes (B1 through B46), and death with missing indication of cause.

3. Model, parameter estimation and life testing

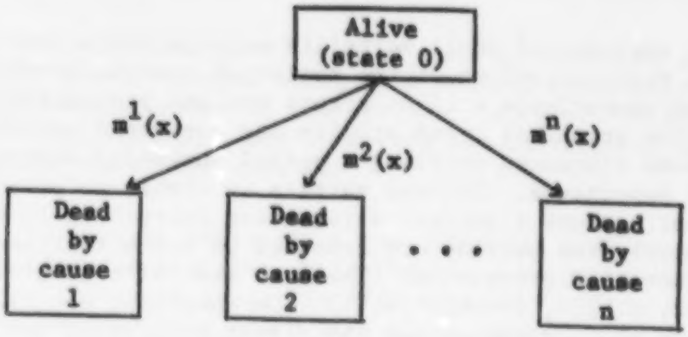
It should be well known that the conventional life table and its generalizations, the so-called multi-state life tables, are interpreteable within the framework of relatively simple time-continuous and age-inhomogeneous statistical models of the Markov-type. The parameters of this model class are the age-depending intensity functions. Starting out from a given regime of age-specific death risks, some demographic implications under the model may be considered by calculating the corresponding life table and the associated life table components, such as state distributions at given ages and various expected life times and waiting times.

In the present study, the emphasis is on the intensity functions and their change over time both as far as infants and adults are concerned. In absence of information on individual social conditions and detailed health histories, the available data are most fruitfully analyzed within the framework of the conventional life table with one or several decrements. In other terms, we consider a Markov process with one transient, and one or several absorbing states. Any life history is seen as the outcome of a repeated random experiment, and the individual life histories are assumed to stochastically independent sample paths of the Markov chain. A flow diagram of the state space of the Markov chain is shown in figure 1.

The cause-age-specific intensity functions of such a model may, conditional on the nature of the available information, be estimated either by fully parametric, by semi-parametric, or by non-parametric statistical methods. Due to rather vague a priori knowledge, a parametric approach appears to be less suitable at the present stage of research. The same is true of semi-parametric estimation entailing formation of occurrence/exposure rates for age intervals selected in "such a way that the 'real' intensity function does not vary too much in each age interval" (cf. Hoem 1976, Section 4C), at least as far as infant survivorship is concerned. Non-parametric estimation is unconditional with respect to shape of the intensity curves.

Figure 1

Flow-diagram of the competing risk model



$m^i(x)$: Intensity of transition from state 0 ('alive') to state i ('dead by cause i'), $i = 1, 2, \ldots, n$.

With the given infant data at hand we turn to the non-parametric methods described for competing risk models by Aalen (1976, 1978). Using non-parametric life testing methods (cf. Aalen et al. 1980; Fleming et al. 1980; Andersen et al. 1981) in combination with computer plotting of the cumulated hazard rates, we set up an information system for monitoring and screening the current survivor process during the first year of life.

Since the individual adult death times are unknown it will be suitable to assume that the cause-specific death intensities are piecewise constant functions of age i.e. step-functions. As estimators of such intensity functions, the occurrence/exposure rates are known to have good statistical properties (cf. Hoem 1976, Section 4C). The asymptotic variance of an o/e-rate is easily estimated by the number of occurrences divided by the square of the exposure time. To obtain estimates of the exposure times by age and period we use linear integration based on the annual age distributions of persons born in Greenland. This type of estimation is commonplace in demography. Due to limitations in data (cf. Section 2), the partioning of the age span (5, 70 > (years) refers to sub-intervals of length five years. Smallness of numbers necessitates some aggregation over time as far as the Greenlandic adults are concerned. Depending on the number of observed deaths by a given cause we partition the total period of 1968–1980 in two or four sub-periods.

Since the approximated Greenlandic exposure times always relate to persons born in Greenland, and owing to the fact that the associated deaths cannot be differentiated by birthplace (inside/outside Greenland) during 1968-1974, the estimates for this period slightly overrate mortality. Non-reported underlying cause of death is treated as a competing death risk from 1975.

The analysis of adult mortality entails comparison over time of the graphic representations of the estimated central death rates. Occasionally our comparisons will be across sex and population (Greenland/Denmark). The graphical trend studies are supported by statistical testing. In some instances existing a priori knowledge warrants one-sided statistical hypotheses. To keep matters as simple as possible, however, we shall test against a general alternative everywhere in the present study. Whenever two periods are compared we use a test based on the asymptotic normal distribution. The test statistic is given by Hoem and Jensen (1982, p. 208, formula (4.2)). On comparing central death rates for more than two periods we use the direct generalization of this test. The generalized test statistic has asymptotically a chi-square distribution with $f=n-1$ degrees of freedom, n denoting the number of periods compared. We use statistical testing for separate age groups (i.e. partial testing) where five or more deaths are expected in each period under the working hypothesis of no change in mortality over time. This rule is based on an optimistic interpretation of results and considerations presented by Schou and Væth (1980). Overall test statistics are produced by summing over age groups satisfying this rule. Note that when only two periods are compared the overall test statistic is especially sensitive to systematic change. This feature is not shared by the pooled test statistic used in cases where more than two periods are compared. The last mentioned test statistic has asymptotically a chi-square distribution with $f=m\cdot(n-1)$ degrees of freedom, m denoting number of age groups and n being the number of periods compared. Concerning the well known problems of interpreting a multitude of significance test results, our attitude is pragmatic as will be evident from the following sections.

4. Some limitations and potentials of the applied model

Within the framework of the competing risk model used in our study, each individual is endowed at birth with a set of mutually independent 'times to die', the actual observed time at death being the minimum of these times. It can be shown that for each joint survival distribution function with dependent times to die, there will exist an equivalent model with independent times to die. So in a sense the individual model used in the present study may describe any survivor process terminated by 'death according to cause'. Such a description does hardly possess any explanatory value since in reality causes of death interact in more complicated ways than envisaged by taking the observed time at death as the minimum

of independent 'latent times'. The assumed homogeneity of the subpopulations defined by cohort (adults: time-age square) and sex is another example of evident lack of realism of the model. In addition to these problems the mootness of the concept of 'underlying cause of death' complicates matters. We do not ignore the difficult problems sketched here and stress the importance of introducing more realistic stochastic models, more informative data, and clarified concepts.

On the other hand, we feel that an empirical study based on the described competing risk model is a natural first step on the way towards a better understanding of the survivor process. We base all inference considerations on this model bearing its descriptive character in mind on interpretation of the results.

In current application the competing risk model combined with life testing and plotting could provide a valuable instrument for indication of change in cause-specific mortality. Significant change in a given cause-specified death risk might give rise to search for plausible explanations such as variation in the quality of medical care, shift in composition of the population, social change and possible conscious or non-deliberate alteration in diagnostic practice. Whatever such conclusions turn out to be they would surely be important to the medical community, to the health authorities, and to the public.

5. Summary of some main results

5.1 Infant mortality

We summarize the level and age pattern of the death intensities in terms of non-parametric estimates of partial probabilities of death and expected age at death from a given cause j, conditional on decease before first birthday, including the estimated standard deviations of these estimates. By a partial measure we perceive nothing more than a certain aspect of the intensity function under study. Our principal purpose is to give estimates of the chosen life table measures and of the integrated intensities differentiated by sex and underlying cause of death for each population. After comparing the integrated death intensities estimated by the cumulated hazard of each death risk we provide estimates for the aggregated particular birth cohorts within each sex and population wherever reasonable. As a guiding principle as to whether aggregation is warranted or not, we use the test-probabilities (P-values) of certain non-parametric test statistics. The results are shown in tables 1 and 2.

If there are k intensities to be compared ($k \geq 2$) the working hypothesis H_0 entails identity of the age dependent death risks m^{α}, $\alpha = 1,2,\ldots,k$, against H_1: $m^{\alpha} \neq m^{\beta}$ for some pair $\alpha, \beta \in \{1,2,\ldots,k\}$. It should be kept in

Table 1. Estimates of partial probabilities ${}_{366}\bar{q}_0^{i} \cdot 10^5$ of death by cause i during the first year of life with estimated standard deviations in parentheses, Danish and Greenlandic birth cohorts by sex.

Population, sex and cohorts	Estimates of partial probability ${}_{366}\bar{q}_0^{i}$ of death by cause i, i = (B-code)							
	B32	B42	B43	B44	B45	B47+B48	Residue	All
Denmark.								
males born								
1976	24 (8.5)	345 (32.1)	425 (35.5)	161 (21.9)	87 (16.1)	{9} (5.2)	137 (20.3)	1,183 (58.9)
1977	29 (9.5)	309 (31.3)	321 (31.8)	157 (22.3)	127 (20.0)	25 (9.0)	123 (19.8)	1,087 (58.1)
1976-1977	26 (6.3)	328 (22.4)	* (*)	159 (15.6)	106 (12.8)	17 (5.1)	131 (14.[illegible])	* (*)
females born								
1976	16 (7.1)	267 (29.2)	194 (24.8)	175 (23.6)	67 (14.6)	19 (7.8)	73 (15.3)	809 (50.4)
1977	{10} (5.8)	243 (28.5)	163 (23.3)	97 (18.0)	43 (12.1)	17 (7.5)	137 (24.9)	709 (48.4)
1976-1977	13 (4.6)	256 (20.40	179 (17.1)	* (*)	55 (9.5)	{18} (5.4)	* (*)	* (*)
Greenland.								
males born								
1969-1971	736 (221.9)	332 (148.6)	1,368 (298.5)	1,236 (281.2)	605 (201.4)	937 (250.4)	472 (178.3)	5,552 (591.8)
1972-1974	{176} (124.6)	{350} (175.2)	1,628 (373.9)	1,033 (297.7)	{264} (152.6)	702 (247.8)	886 (280.1)	4,960 (632.5)
1975-1977	630 (238.2)	810 (269.8)	1,480 (358.9)	1,053 (303.8)	{362} (180.9)	{271} (156.6)	1,347 (348.0)	5,811 (689.0)
1969-1977	* (*)	480 (113.1)	1,480 (196.1)	1,119 (170.6)	429 (107.3)	* (*)	859 (151.8)	* (*)
females born								
1969-1971	1,058 (273.1)	{213} (123.1)	830 (239.3)	762 (229.7)	{211} (121.9)	708 (224.0)	994 (265.6)	4,683 (554.5)
1972-1974	{100} (100.5)	{101} (101.1)	1,276 (353.9)	690 (260.4)	{300} (173.1)	{301} (173.6)	702 (265.2)	3,425 (568.9)
1975-1977	{38[illegible]} (190.2)	564 (229.7)	1,029 (310.2)	467 (208.7)	{189} (133.8)	{0} (0)	755 (267.2)	3,340 (547.7)
1969-1977	* (*)	287 (90.8)	1,019 (169.9)	462 (135.9)	230 (81.3)	* (*)	836 (155.3)	* (*)

Legend: Estimates based on numbers smaller than five are given in braces { }. The symbol (*) indicates that aggregated cohort estimates have not been prepared due to supposed deviations between successive birth cohorts.

Source: Estimates based on data from the National Health Service and official statistics.

Note: For an English definition of the B-codes, cf. Appendix 1.

<u>Table 2</u>. Estimates of expected partial age $\bar{a}^{i}(y)$ at death by cause i, conditional on death before age y(= first birthday), with estimated standard deviations in parentheses, Danish and Greenlandic birth cohorts by sex.*)

Population sex and cohort	Estimate $\hat{\bar{a}}^{i}(y=366)$ (days), i = (B-code)													
	B32		B42		B43		B44		B45		B47+B48		Residue	
<u>Denmark</u>,														
males born														
1976	90.5	(29.47)	42.1	(6.85)	5.3	(1.25)	5.8	(1.53)	116.1	(10.67)	[98.2]	(25.19)	87.9	(13.47)
1977	105.9	(21.71)	60.5	(8.80)	8.6	(2.94)	4.5	(2.61)	95.0	(7.02)	174.1	(33.84)	126.2	(17.44)
1976–1977	98.7	(18.10)	50.5	(5.52)	*	*	5.2	(1.48)	103.8	(6.23)	153.3	(27.32)	106.6	(10.99)
females born														
1976	87.6	(18.00)	43.9	(7.24)	2.8	(0.42)	3.5	(0.90)	94.4	(11.79)	206.5	(44.11)	103.0	(21.76)
1977	[31.9]	(12.10)	56.1	(9.80)	3.1	(0.61)	9.0	(4.16)	79.7	(11.41)	201.4	(54.35)	111.0	(16.63)
1976–1977	65.5	(15.10)	49.5	(6.00)	2.9	(0.36)	*	*	88.6	(8.58)	205.0	(34.49)	*	*
<u>Greenland</u>,														
males born														
1969–1971	92.1	(28.06)	42.1	(12.09)	3.5	(0.77)	2.6	(0.80)	112.2	(26.61)	87.7	(15.66)	136.3	(29.79)
1972–1974	[70.0]	(10.26)	[70.5]	(48.58)	9.6	(7.90)	1.9	(0.56)	[80.9]	(18.09)	83.2	(24.94)	182.9	(27.24)
1975–1977	97.7	(38.66)	89.3	(24.69)	1.1	(0.27)	6.2	(3.68)	[93.4]	(20.76)	[89.0]	(24.50)	103.3	(19.16)
1969–1977	*	*	72.1	(17.41)	4.8	(2.71)	3.4	(1.13)	101.5	(16.53)	*	*	135.1	(15.26)
females born														
1969–1971	95.9	(17.55)	[130.4]	(45.17)	1.3	(0.37)	2.1	(0.94)	[49.5]	(20.99)	135.9	(31.05)	154.3	(19.89)
1972–1974	[161.2]	(-)	[305.5]	(.)	2.4	(0.89)	1.3	(0.39)	[72.6]	(45.42)	[97.1]	(37.12)	172.5	(38.67)
1975–1977	[125.8]	(56.89)	27.9	(15.32)	6.8	(4.46)	11.1	(9.31)	[66.4]	(46.11)	-	(.)	79.6	(29.32)
1969–1977	*	*	57.0	(32.00)	3.4	(1.46)	3.9	(2.23)	62.6	(22.39)	*	*	138.2	(17.04)

*) $\hat{\bar{a}}^{i}(y) = (\int_0^y \hat{\bar{p}}^{i}(0,\tau)d\tau - y\,\hat{\bar{p}}^{i}(0,y))\,/(1-\hat{\bar{p}}^{i}(0,y))$; $\sigma^2_{\hat{\bar{a}}^{i}(y)} = (\sum_{j=1}^{J_i}(N_0(t_j^i))^{-2}(\int_0^{t_j^i}\hat{\bar{p}}^{i}(0,\tau)d\tau - \hat{\bar{a}}^{i}(y))^2)/(1-\hat{\bar{p}}^{i}(0,y))^2$,

J_i denoting number of deaths by cause i, t_j^i is time at death number j by cause i, $N_0(t_j^i)$ being the population at risk at time t_j^i, and $\hat{\bar{p}}^{i}(0,\tau)$ indicating estimate of the partial probability of survival over age (0, τ).

<u>Legend</u>: Estimates based on numbers smaller than five are given in braces [ ]. The symbol (*) indicates that aggregated cohort estimates have not been prepared due to supposed deviations between successive birth cohorts. The symbol (-) denote no observation of death by the given cause. The signature (.) means category not applicable.

<u>Source</u>: Calculation based on official statistics and data from National Health Service.

mind that populations subject to life testing should be of a certain minimum size, given the magnitude of the intensities. No rule of thumb seems to be available for the time being as to required intensity and population size. Admittedly somewhat arbitrarily, we consider the test results important whenever five or more deaths by a given cause are expected under H_0 for each of the death risks compared. We calculate expected numbers as described by Tarone and Ware (1977).

Using the number of livebirths and deaths by cause within the cohorts considered (cf. Appendices 1 and 2), it may be seen that the difference between the partial and the influenced death probabilities are of minor importance with the given levels of infant mortality in Denmark and Greenland. Apart from attrition due to cause B42 (congenital malformations), all death risks considered appear to be much higher in Greenland than in Denmark (table 1). Likewise mortality seems to be higher for males than for females within each population for most causes. The relative importance of cause-specific death risk differs somewhat across sex and population. Death by cause B43 (birth injuries) appears to have the highest intensity integral over the first year of life of all age-specific death risks in Greenland (table 1). As far as Danish males are concerned, B43 ranges on a par with risk of death by cause B42 (congenital malformations) as the most intense force of attrition. Congenital malformations, apparently, is the most intense death risk of Danish females. Death risk by cause B32 (pneumonia) and B47+B48 (accidents) have the smallest relative importance in Denmark while in Greenland these two death risks have been subject to considerable change over time, and so have their relative importance.

The estimates of partial mean age at death display a low variability for each death risk with sex, birth cohort and population (table 2). The mean age at death by cause B47+B48 (accidents), however, appears to be somewhat lower in Greenland than in Denmark. It may be of interest to note that given proportional hazards and low mortality like that observed in the Danish and Greenlandic cohorts under study, the partial expected age at death can be shown to be approximatively unaffected by difference in level of mortality.

Due to the time constraint on the oral presentation of the project and to existing space limitations for contributions to the Proceedings, we shall leave it at giving just a couple of examples of detailed results.

In Figure 2, a survey of cumulative hazard plots relating to the male cohort born in Denmark between 1976 and 1977 is presented. The plots of birth injuries (B43) and other perinatal mortality (B44) are heavily arched to the left compared to those of the other death risks considered. Since mortality is low, an approximate guess of the partial probability of death over any age interval $[x,y[\subseteq [0,366]$ (days) may be obtained by subtracting the ordinate at age x from the ordinate at age y. From the estimates of the corresponding partial expected age at death, altogether over the first year

of life (table 2), is seen again, that there are big differences in age structure of the cause-specific death risks considered.

In Figures 3 and 4, finally, we present cumulative hazard plots due to accidents for each sex of the cohorts born in Greenland between 1969 and 1971, between 1972 and 1974, and between 1975 and 1977. As would be expected from other evidence accidental mortality (B47+B48) has displayed some decrease over time. In view of this situation, we give no aggregate cohort estimates although only the female trend was found to produce an extreme test statistic. Note that the low expected numbers of accidental deaths warrant caution in conclusion in terms of statistical significance.

A comparison between Greenlandic infant mortality and infant mortality in some Canadian Inuit populations between 1945 and 1970 may be found in Hansen (1982a).

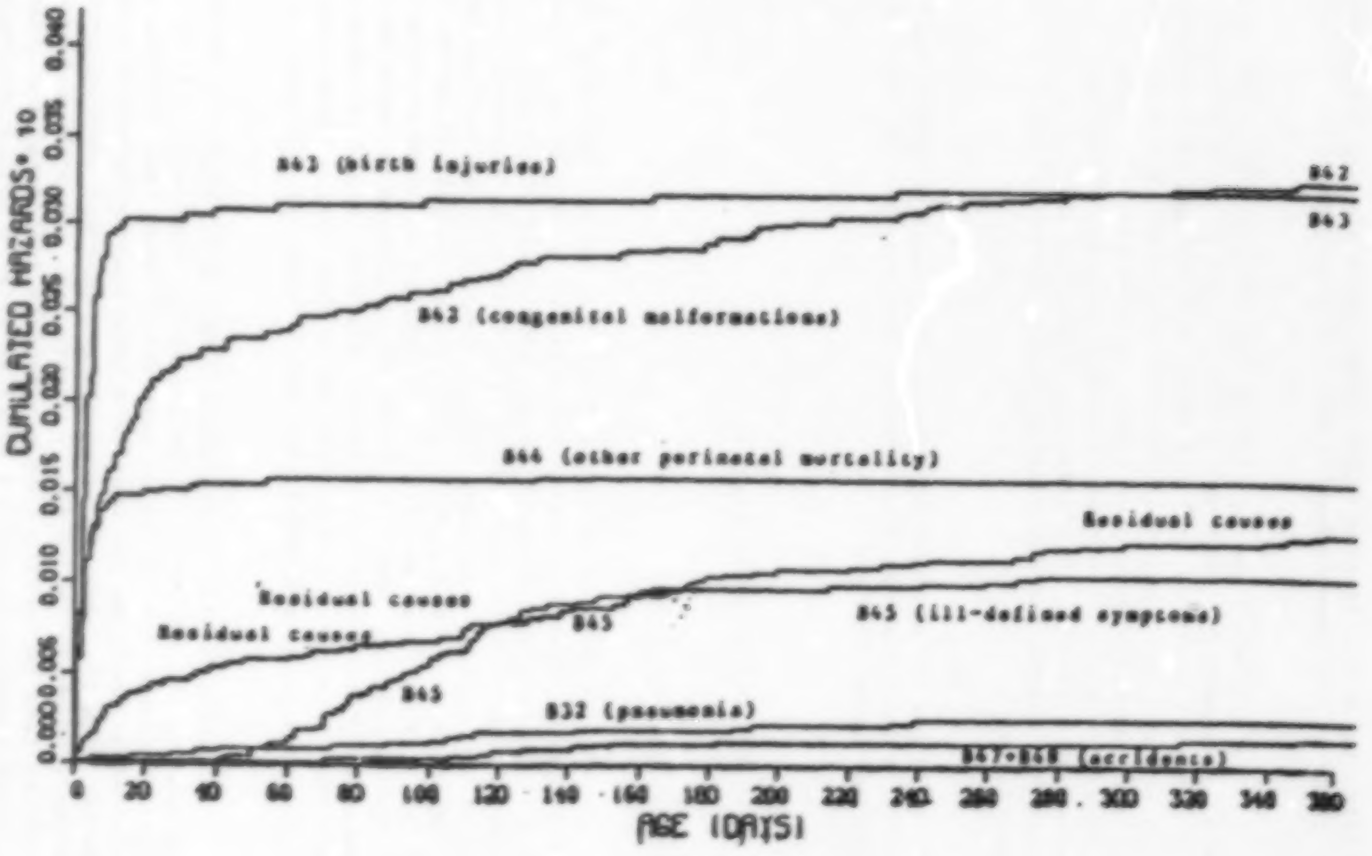
5.2 Adult mortality

5.2.1 Introduction

The expedience of the medical concept of 'external' causes of death clearly hinges on the possibility of establishing a causal connection between death and factors which are physically extraneous to the body of man. Accepting the WHO classification (Eight International Revision) of cause of death, at least as a working scheme, death induced by 'external' causes may be expected to be a prominent indicator of social change and of economic, social, and cultural structure. If that be so, then we have one good reason to concentrate our study on the external aspects of adult mortality. Death caused by various external factors, moreover, would probably comply better with the theoretical requirement of stochastically independent 'latent times' of the competing risk model than death caused by different internal factors.

Although most of the death risks under study may be seen as social indicators, the emphasis of the following exposition will be on presentation and discussion of the measurements rather than on speculations about the social phenomena that may have been associated causally in one way or another with the given recorded changes in human survivorship. Being imposed by the straightjacket of public statistics, the present macroscopic view is hoped to lead to results that may provide additional incitements for micro-oriented demographic studies based on primary population registers.

<u>Fig. 2</u>: A survey of cumulative hazard plots relating to the male cohort born in Denmark between 1976 and 1977.*)



*) <u>Note</u>: The step curve of cause B43 (birth injuries) refers to the cohort born during 1977.

Fig. 3: **Cumulative hazard plots for male cohorts born in Greenland between 1969 and 1977. Cause of death: B47+B48 (accidents).**

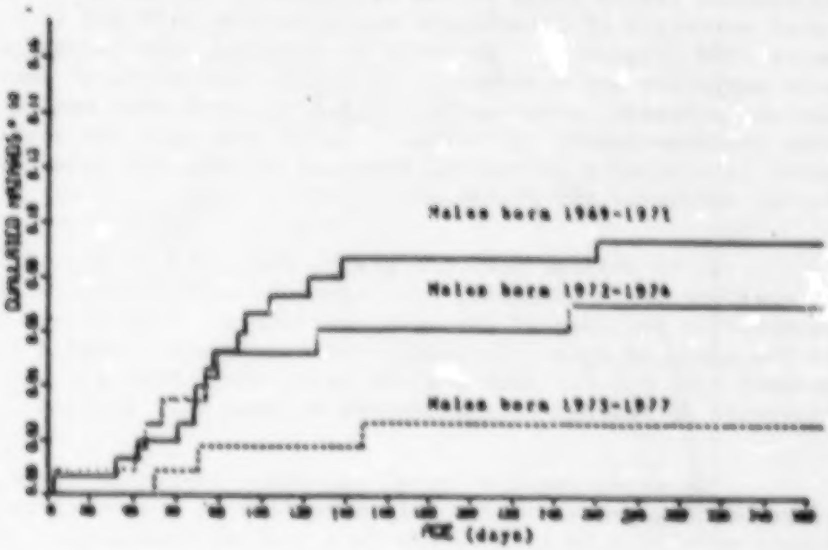
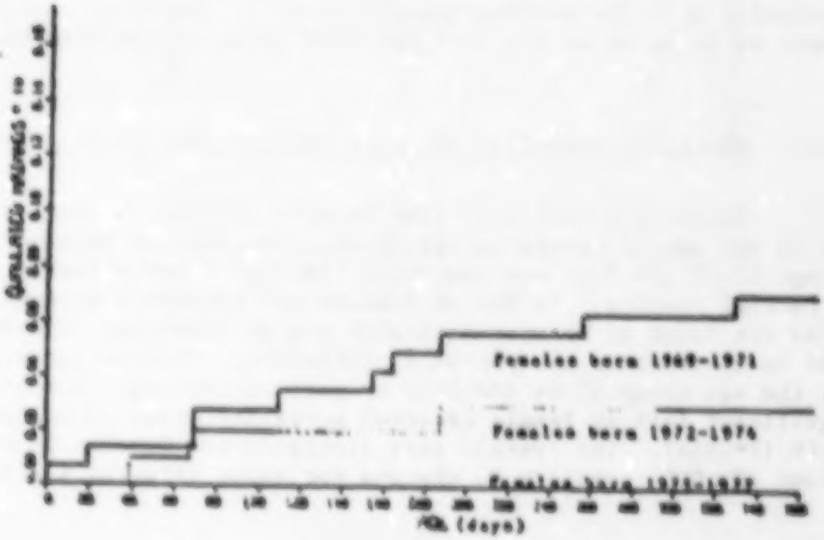


Fig. 4: **Cumulative hazard plots for female cohorts born in Greenland between 1969 and 1977. Cause of death: B47+B48 (accidents).**



5.2.2. Total mortality

To convey an impression of the magnitude of the estimated error attached to the estimates of the central death rates, we use the 95 per cent confidence limits based on the (asymptotic) normal approximation for the total mortality of Greenlandic males between 1978 and 1980 and of Danish males 1980 (Figure 5). As would be expected, the estimates of Greenlandic male mortality are systematically higher than those of Danish males. The Danish estimates, moreover, are inflicted with much smaller estimation error than the Greenlandic estimates. It is seen that the absolute estimation error is a rapidly increasing function of age, not least as far as the Greenlandic estimates are concerned.

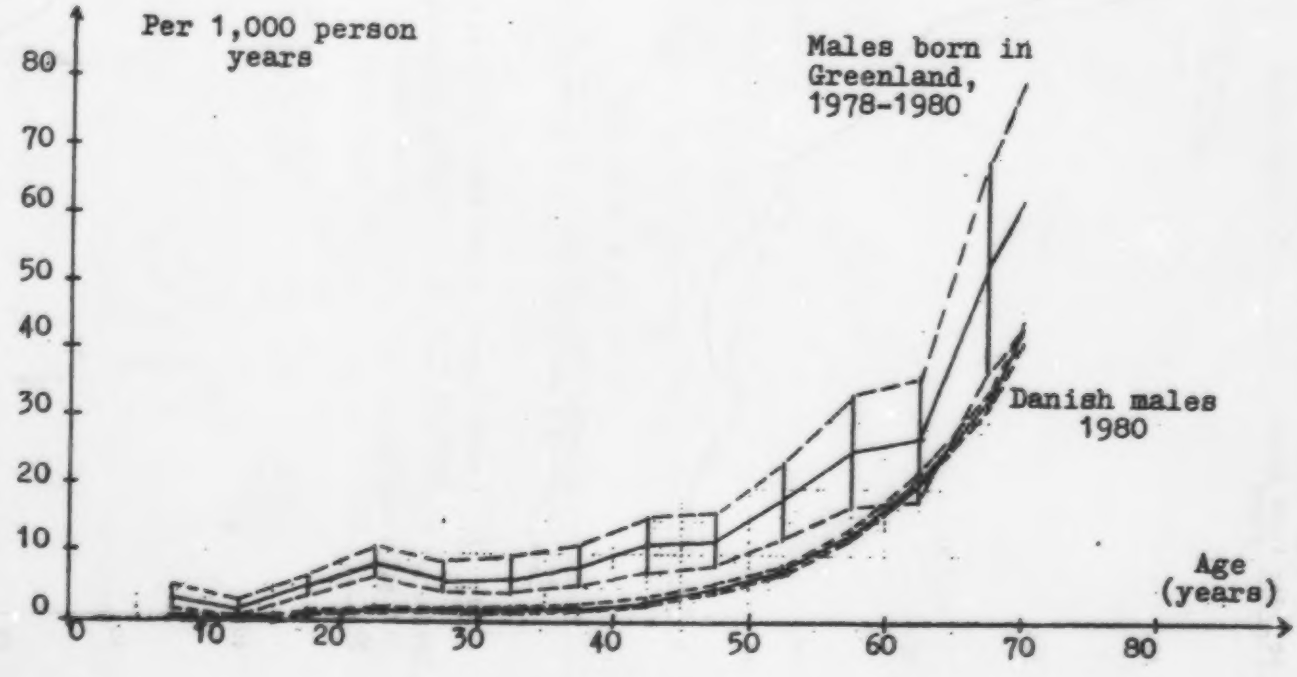
It is evident from the graphs displayed in Fig. 5 that the assumption of constant death intensity over age intervals of length five years is rather unrealistic for some of the ages considered. This particularly, is the case in the advanced ages. Certainly one should not extend an analysis of the present type too far into the old ages. Note that our use of five-year age intervals is imposed by limitations in data (cf. Section 2).

The development of total mortality on period basis, by sex, is displayed in Figures 6 and 7. Male mortality is systematically higher than female mortality in each of the four periods considered. Male mortality in age c.25 and older seems to have been somewhat lower in the period 1975-77 than in the other three periods considered. With this exception there is not much change in male mortality over time. Female mortality seems to have changed even less over time, in particular before age 55. The rate was unusually low in age 55-59 between 1968 and 1971. This deviation is statistically significant by partial testing for the age group 55-59 (P=.028) (P: Probability of significance). Overall testing based on the mortality experience of all periods and of all age groups considered leads to the conclusion that the working hypothesis of no mortality change of either sex cannot be rejected at the five per cent level of significance.

5.2.3. Mortality caused by external factors (B47 through B50)

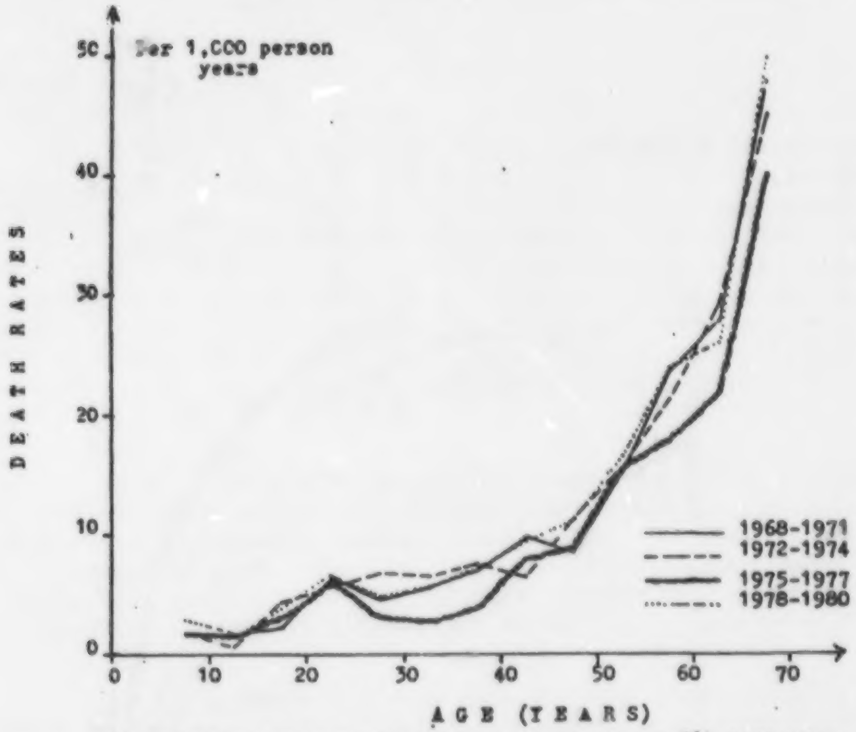
There is a fall over time in male external mortality rates between age 25 and age 60 except in age 40-44. The fall in male mortality rates in age 25-29 (P=.073) and age 30-34 (P=.056) is very nearly significant by partial testing. As far as females are concerned external mortality rates are found to be systematically higher after age 50 between 1975 and 1980 in contrast to the period of 1968-1974. This increase is significant for the age group 60-64 (P=.000) by partial testing. A statistically significant fall in female external mortality rates is encountered in age 45-49 (P=.016). The overall test statistic for females is clearly significant (P=.000) contrary to the one for males (Figures 8 and 9).

Fig. 5: Plots of estimated central death rates of males born in Greenland, 1978-1980, and of Danish males 1980. With 95 per cent partial confidence intervals (*).



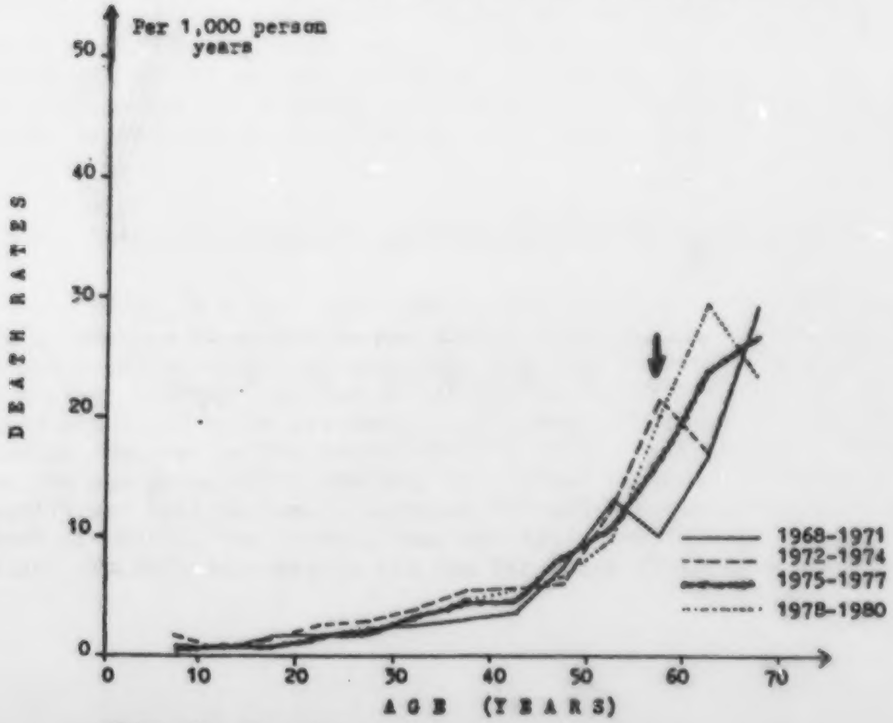
*) Greenland: Including deaths with missing cause.

Fig. 6: Central death rates 1968-1980, all deaths, males born in Greenland. (*)



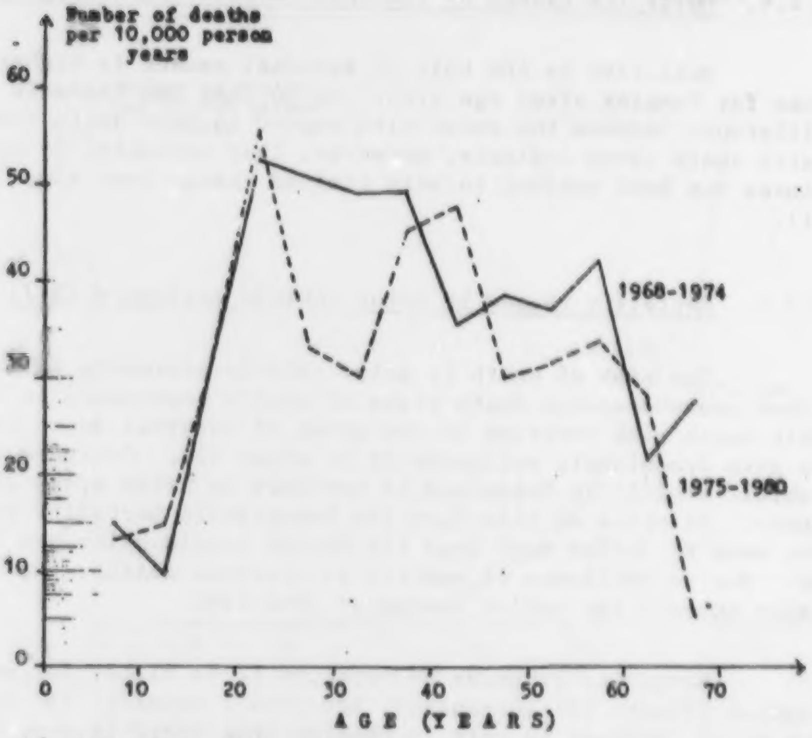
*) Excluding deaths with missing cause. Arrow (↓) indicates statistically significant deviation at the five per cent level.

Fig. 7: Central death rates 1968-1980, all deaths, females born in Greenland. (*)



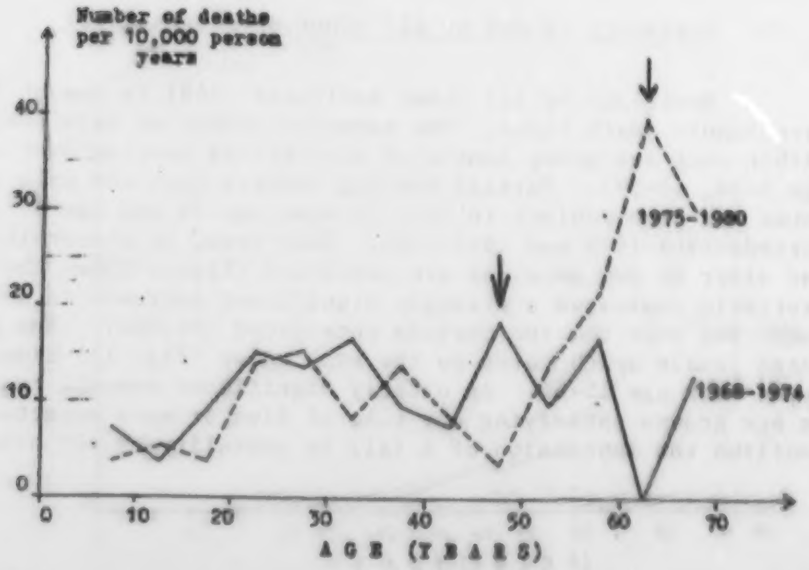
*) Cf. fig. 6, note.

Fig. 8: Central death rates 1968-1974 and 1975-1980, death by external causes, males born in Greenland. (*)



*) Cf. fig. 9, note.

Fig. 9: Central death rates 1968-1974 and 1975-1980, death by external causes, females born in Greenland. (*)



*) Arrow (↓) indicates statistically significant deviation at the five per cent level.

5.2.4. Mortality caused by internal factors (B1 through B46)

Mortality by the bulk of internal causes is higher for males than for females after age c.45. Up to that age there is very little difference between the sexes with regard to this death risk. The estimated death rates indicate, moreover, that mortality by all internal causes has been subject to very limited change over time (figures 10 and 11).

5.2.5. Mortality caused by motor vehicle accidents (B47)

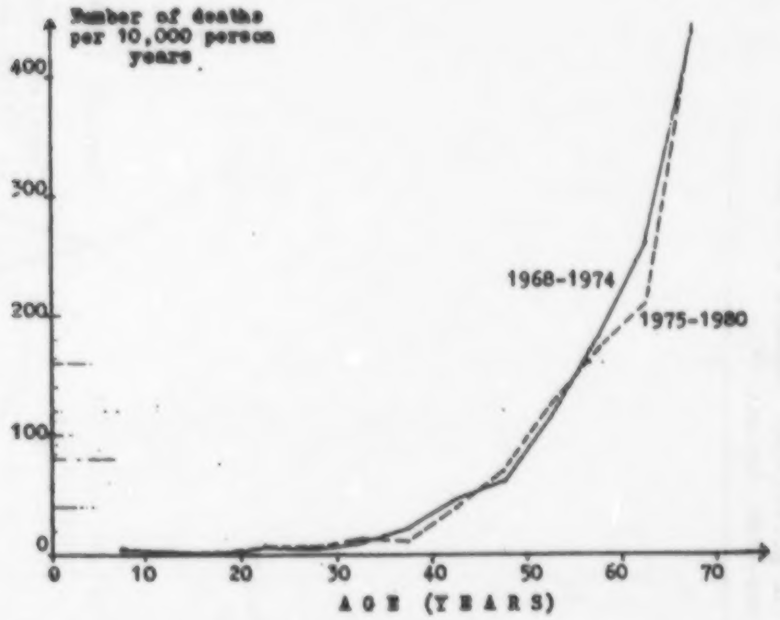
The risk of death by motor vehicle accidents is low compared to the other cause-specific death risks of adults considered in this study. Since this death risk pertains to the group of external death risks by the B-List we give Greenlandic estimates of it after all. Contrary to Denmark, motor vehicle traffic in Greenland is confined to urban areas and local settlements. In spite of this fact the Greenlandic mortality by cause B47 does not seem to differ much from the Danish levels below age 15 and above age 30. Due to smallness of numbers of observed deaths, the Greenlandic estimates embrace the entire period of 1968-1980.

Mortality by cause B47 appears to be higher for males than for females (Figure 12) (Greenland: Age 15-45; Denmark: All age groups). It may be of interest to note in passing that there is some indication of a systematic decline in Danish mortality by cause B47 during recent years. By partial testing this decrease is found to be statistically significant at the five per cent level between age 5 and age 15, and after age 60. We do not give this evidence here.

5.2.6. Mortality caused by all other accidents (B48)

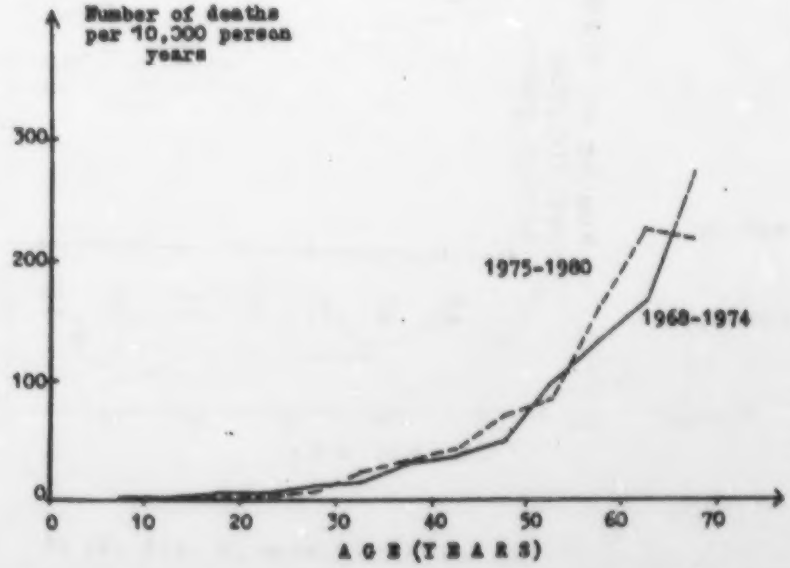
Mortality by all other accidents (B48) is one of the major external Greenlandic death risks. The expected number of male deaths by cause B48 within each age group admits of statistical testing over age 5-65 (females: Age 5-34, 55-59). Partial testing reveals that the male death risk by this cause has been subject to fall between age 20 and age 35 if we compare the periods 1968-1974 and 1975-1980. This trend is discernible from age c.15 and older as far as males are concerned (Figure 13). The overall test statistic indicates a strongly significant decrease in male mortality by cause B48 over the two periods considered (P=.000). The graph of the estimated female death rates by the same cause (Fig. 14) displays a similar trend over age 15-55. An utterly significant overall test statistic based on age groups satisfying our rule of five or more expected deaths (P=.008) confirms the impression of a fall in mortality by all other accidents.

Fig. 10: Central death rates 1968-1974 and 1975-1980, death by internal causes, males born in Greenland (*).



*) Cf. fig. 9, note.

Fig. 11: Central death rates 1968-1974 and 1975-1980, death by internal causes, females born in Greenland (*).



*) Cf. fig. 9, note.

Fig. 12: Plots of central rates for death by cause B47 (motor vehicle accidents), Denmark 1980 and Greenland 1968-1980, by sex (*).

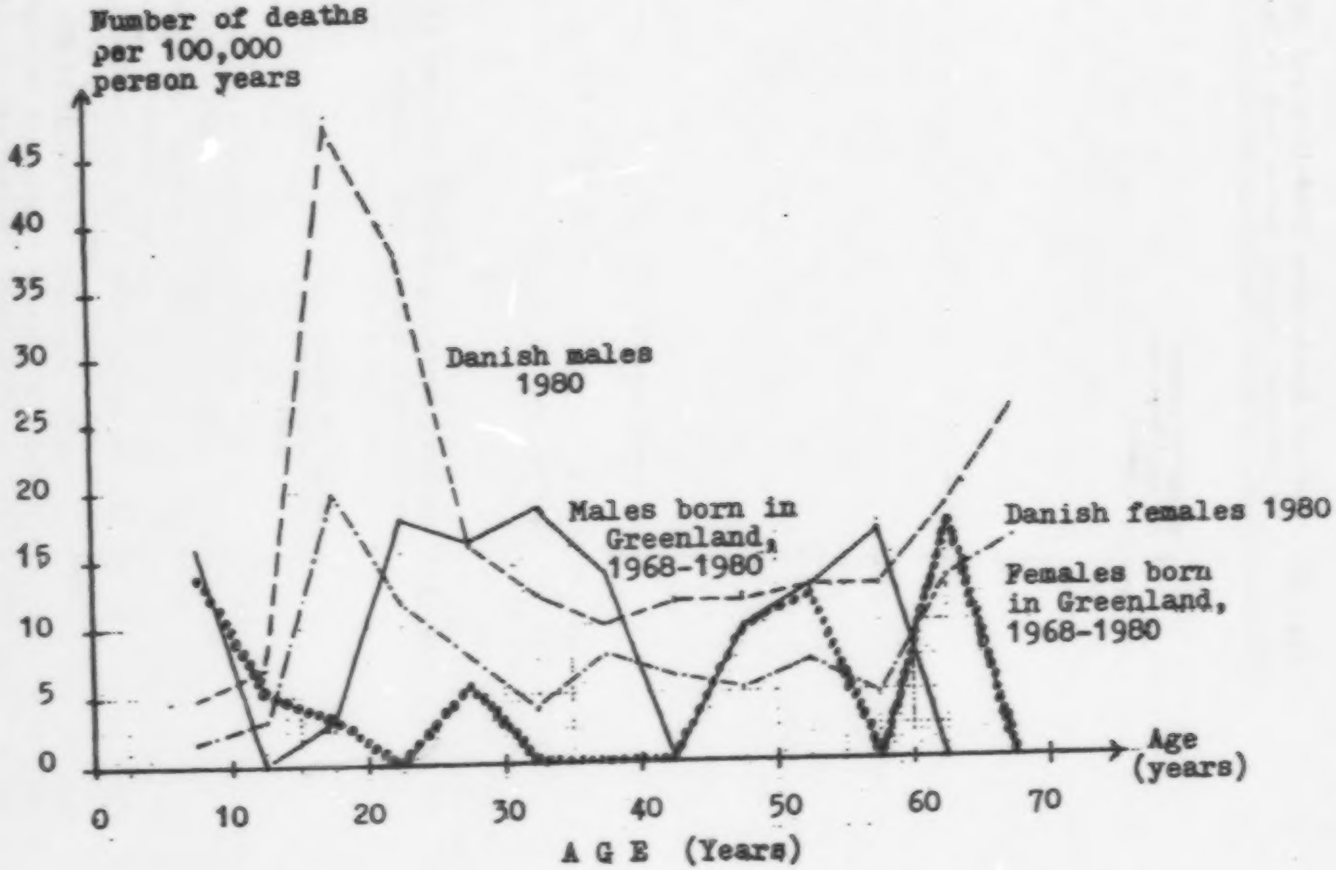
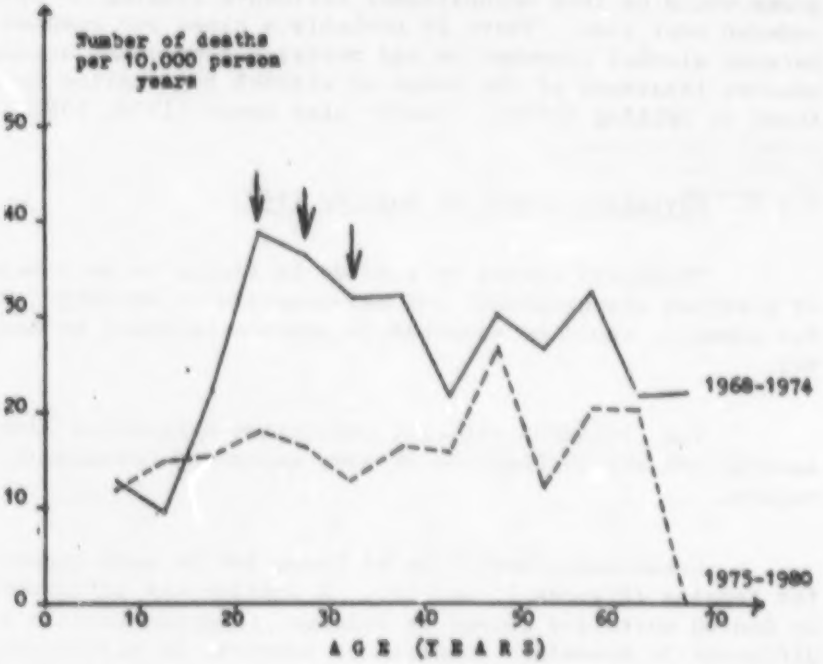
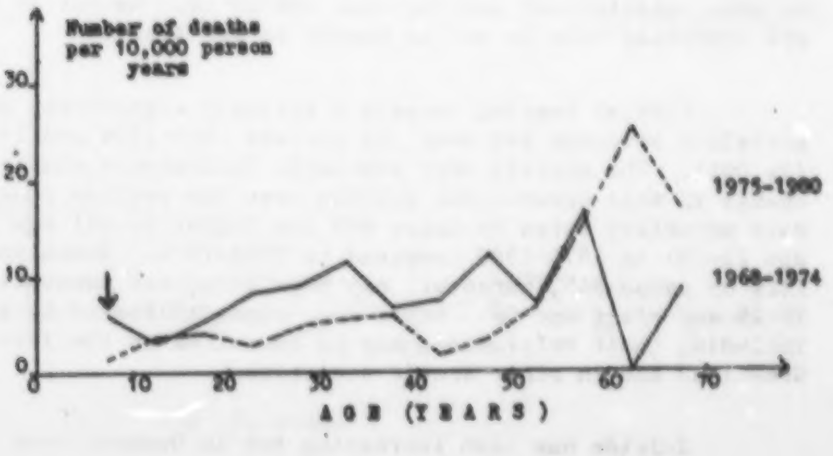


Fig. 13: **Central death rates 1968-1974 and 1975-1980, death by cause B48 (accidents), males born in Greenland. (*)**



*) Cf. fig. 9, note.

Fig. 14: **Central death rates 1968-1974 and 1975-1980, death by cause B48 (accidents), females born in Greenland. (*)**



*) Cf. fig. 9, note.

The unpublished official population statistics does not permit further specification of accidental mortality by cause. A reasonable guess would be that occupational accidents leading to death have been reduced over time. There is probably a close but complex connection between alcohol consumption and mortal occupational accidents. A comprehensive treatment of the issue of alcohol consumption in Greenland may be found in Sølling (1974). Confer also Lynge (1978, 1982).

5.2.7. Mortality caused by suicide (B49)

Mortality caused by suicide is likely to be a sensitive indicator of personal disengagement and mal-adaption to society. Rapid social change, for example, could be expected to produce increase of mortality by cause B49.

The available official population statistics admits of discerning several remarkable features of this aspect of Greenlandic and Danish mortality.

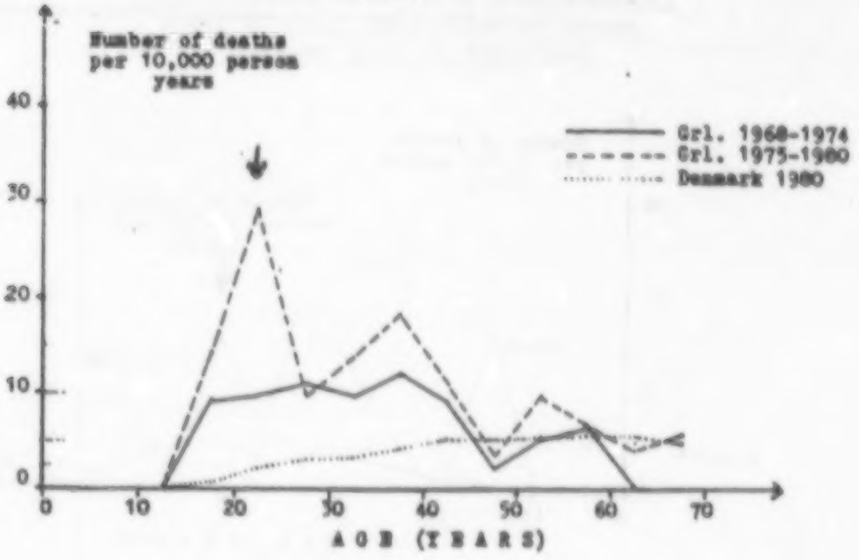
Greenlandic mortality by cause B49 is much higher for males than for females (Figures 15 and 16). A similar sex differential is discernible in Danish mortality caused by suicide. The age pattern of suicide is very different in Greenland compared to Denmark, in particular of males. Danish suicidal mortality appears to be increasing with age in the interval of age c. 10 - c. 55, whereas the modes of the Greenlandic risk plots are located between age 20 and age 30 (age 40). Male mortality caused by suicide is much higher in Greenland than in Denmark below age c. 45. Greenlandic females between age 15 and age 30 appear to have higher mortality caused by suicide than Danish women.

The expected number of male Greenlandic suicides is large enough to admit statistical testing over age 15-44. As far as Greenlandic females are concerned this is not so except in age 20-24.

Partial testing reveals a strongly significant increase in male mortality by cause B49 over the periods 1968-1974 and 1975-1980 in age 20-24 (P=.001). The overall test statistic indicates a statistically significant change in male Greenlandic suicide over the periods considered (P=.010). Male mortality rates by cause B49 are higher in all age groups (except in age 25-29) in 1975-1980 compared to 1968-1974. Greenlandic female mortality by cause B49, moreover, may have increased somewhat over time in age 20-29 and after age 50. Grove and Lynge (1979) and Lynge (1981, 1982), including their references, may be consulted on the issue of suicide in Greenland and in other Arctic societies.

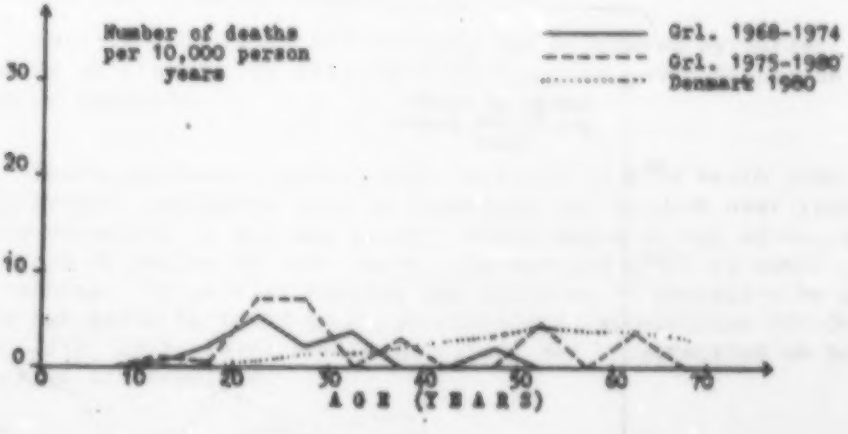
Suicide has been increasing too in Denmark over the recent years.

Fig. 15: Central death rates 1968-1974 and 1975-1980, death by cause B49 (suicide), males born in Greenland.(*)



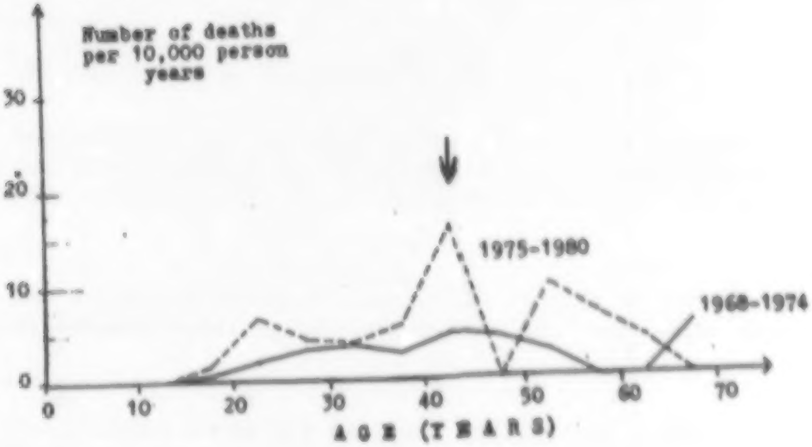
*) Cf. fig. 9, note.

Fig. 16: Central death rates 1968-1974 and 1975-1980, death by cause B49 (suicide), females born in Greenland.(*)



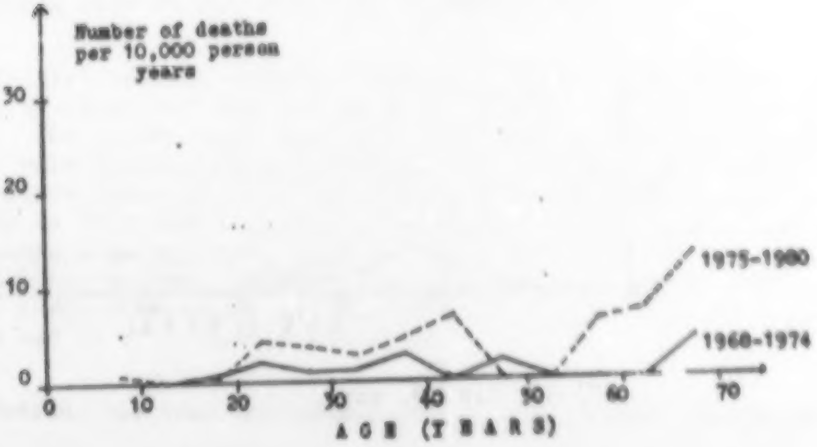
*) Cf. fig. 9, note.

Fig. 17: Central death rates 1968-1974 and 1975-1980, death by cause B50 (all other external causes i.e. homicide and injuries unverifiable as accidents, suicide or homicide), males born in Greenland.(*)



*) Cf. fig. 9, note.

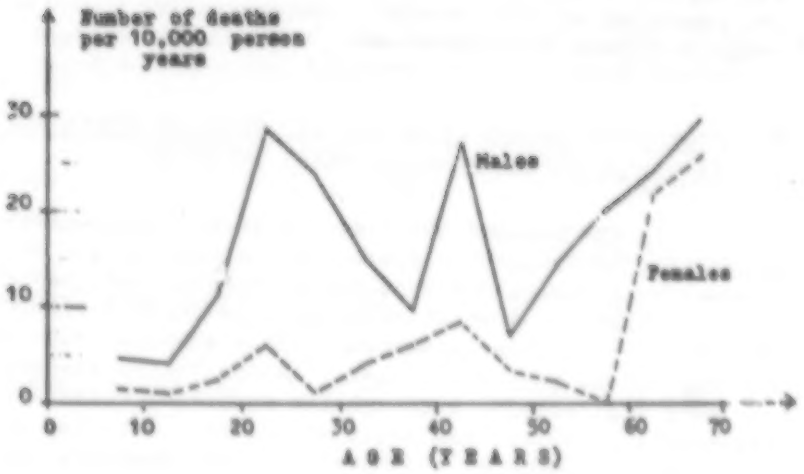
Fig. 18: Central death rates 1968-1974 and 1975-1980, death by cause B50 (all other external causes i.e. homicide and injuries unverifiable as accidents, suicide or homicide), females born in Greenland.(*)



*) Cf. fig. 9, note.

Figure 19

Central death rates 1975-1980, by sex, death without indication of cause, persons born in Greenland.



5.2.8. Mortality due to all other external causes (B50)

Mortality by cause B50 includes death induced by murder, homicide or assault on others. It also embraces injuries unverifiable as accidents, suicide or homicide.

There has been a perceptible increase in this death risk in almost all age groups considered both in Greenland and Denmark over recent years. With the exception of one age group, namely males in age 40-44, the expected numbers of deaths by this death risk are too small to admit of statistical testing. By partial testing the increase in mortality by cause B50 in this age group is found to be statistically significant (P=.042). Hansen (1972, 1975, 1978) and Lynge (1979) may be consulted on homicide and other crime in Greenland.

The annual age pattern of this death risk of Danish males is characterized by a hump between age 20 and age 40.

5.2.9. Greenlandic mortality with missing indication of cause of death

Mortality with missing indication of cause of death is systematically higher for males relative to females in all age groups.

The sex differential of this death risk is likely to be associated with the higher accidental death risk of Greenlandic males. Fishing, hunting and trapping far away from home frequently impose some delay on the reporting of some deaths. Administrative measures have recently been taken to reduce these problems.

6. Some wider perspectives for the study of Greenlandic and Danish infant mortality and Greenlandic adult mortality

In the present contribution we have disregarded the problem of population heterogeneity due to limitations in the data at hand. The model assumption of homogeneity of the subpopulations considered is far from being realistic. A striking example is infants with observed or unrecognized congenital malformations. This subpopulation obviously is the only one exposed to that death risk. In the Danish demographic literature there are many indications, although few downright measurements, of various differentials in infant and adult mortality. Detailed studies in the literature is beyond the scope of this presentation, however. As far as infant mortality studies are concerned the reader may consult Hansen (1982a-b).

Given access to the existing primary individual data extracted from the National Population Registers in an expedient and decently anonymized manner, better measurement and more detailed demographic inference obviously could be produced than that presented in the present study. As far as other fields of research on the Greenlandic society are concerned (psychiatry, sociology etc.), we feel that the results on the level and trend of suicide and of all other external causes, in particular homicide and assault on others, are so alarming that they provide a strong incentative to intensivating the study of the severe social problems developing in Greenland in these years.

Acknowledgements

Adding to the acknowledgements in Hansen (1982a-b), helpful suggestions from Ulla Funck Jensen are gratefully appreciated.

Appendix 1

English definition of the B-codes and survey of the detailed WHO-codes included in the various B-codes.

Diagnose	B-code	WHO-codes
Pneumonia	32	480-486
Congenital malformations	42	740-759
Birth injuries	43	764-768, 772, 776
Other perinatal mortality	44	760-763, 769-771, 773-775, 777-779
Ill-defined symptoms	45	780-796
Accidents	47+48	E800-E807, E810-E823, E825-E949
All other causes of death	Residue	All other Who-codes (residue)

Source: Sundhedsstyrelsen (1976).

Appendix 2

Number of livebirths and deaths by cause and sex, cohorts born in Denmark between 1976 and 1977, and generations born in Greenland between 1969 and 1977.

Population, sex and cohort	Number*) of livebirths	Number of deaths+) by cause i, i = (B-code)							Total number of deaths
		B32	B42	B43	B44	B45	B47+48	Residue	
Denmark									
males born									
1976	33,734	8	116	143	54	29	3	46	399
1977	31,823	9	98	102	50	40	8	39	346
1976-1977	65,557	17	214	245	104	69	11	85	745
females born									
1976	31,533	5	84	61	55	21	6	23	255
1977	30,055	3	73	49	29	13	5	41	213
1976-1977	61,588	8	157	110	84	34	11	64	468
Greenland									
males born									
1969-1971	1,549	11	5	21	19	9	14	7	86
1972-1974	1,174	2	4	19	12	3	8	10	58
1975-1977	1,153	7	9	17	12	4	3	15	67
1969-1977	3,876	20	18	57	43	16	25	32	211
females born									
1969-1971	1,452	15	3	12	11	3	10	14	68
1972-1974	1,022	1	1	13	7	3	3	7	35
1975-1977	1,078	4	6	11	5	2	0	8	36
1969-1977	3,552	20	10	36	23	8	13	29	139

*) Source: Official statistics.

+) Source: Data from the National Health Service.

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Demographic Evolution of the Inuit of Northern Québec, the Northwest Territories, Greenland and Alaska from 1930 to the Present.

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Introduction

In any study based on a statistical knowledge of the Inuit of the various Nordic regions, two obstacles are encountered: the lack of data and the often dubious quality of the available sources. Notwithstanding these two problems, indexes commonly used in demography were employed in an attempt to provide an overview of the evolution of the Inuit population in the four regions in which they are concentrated. This operation will permit the population characteristics of the Inuit living in a particular region to be compared not only with those of the Inuit living in other regions but also with the total population in each region.

Sources

The quality and availability of the data on the Inuit varies from region to region. The indexes for Northern Québec were calculated both from the raw data provided directly from the vital statistics and the censuses and from information derived from the Inuit Population Register developed by the Département de démographie of the Université de Montréal(1). This register contains more information than the traditional sources and therefore ensures greater coverage of the Inuit population of Northern Québec. In fact, Louise Normandeau and Jacques Légaré (1979) showed that for some years, the number of births traced using all available sources was up to twice as high as the number obtainable from the vital statistics only. Two values will therefore be associated with the majority of indexes pertaining to the Inuit of Northern Québec: one "unrevised" (calculated from the data derived from official sources), the other "revised" (estimated from the data contained in the Inuit register). The unrevised values will permit a comparison with the indexes calculated for the Inuit of the Northwest Territories, since the data on these Inuit are also derived from the vital statistics and the censuses. In view of the geographic dispersion of the

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(1) For further information, refer to Choinière, R. and N. Robitaille (1982).

Inuit of the Northwest Territories, one would expect the official records of the demographic events to which this population is subject to be as incomplete as in Northern Québec. The revised values will also be used to more accurately paint the demographic picture of the Inuit of Northern Québec and to compare their situation with that of the Inuit population of Greenland, which seems to be covered quite completely. It should be noted that in this region, little distinction is made between the Inuit population and the natives of Greenland due to extensive interbreeding and the near impossibility of providing an adequate definition of persons of Inuit origin (Hansen, 1980). Finally, total population counts only are available for the Inuit of Alaska. The data on the native population of this region (including Inuit, Aleuts and Indians) were therefore used; Inuit comprise almost half of this group. Moreover, in view of the geographic and social proximity of these three peoples, the indexes calculated for the native population should provide a good idea of the demographic characteristics of the Alaskan Inuit.

Population Growth

As Figure 1 illustrates, the Inuit population of the various regions has grown significantly from 1930 to the present, quadrupling in Northern Québec and almost tripling in the Northwest Territories and Greenland. The growth of the Inuit population in Alaska and Greenland was more pronounced prior to 1960, particularly during the 1950s. It is interesting to note that the Inuit population of Greenland has grown only slightly since 1970, whereas those of Northern Québec and the Northwest Territories have grown at an increasingly rapid rate since 1960. While the Northwest Territories rate has remained constant since that time, the Northern Québec rate declined slightly between 1971 and 1977.

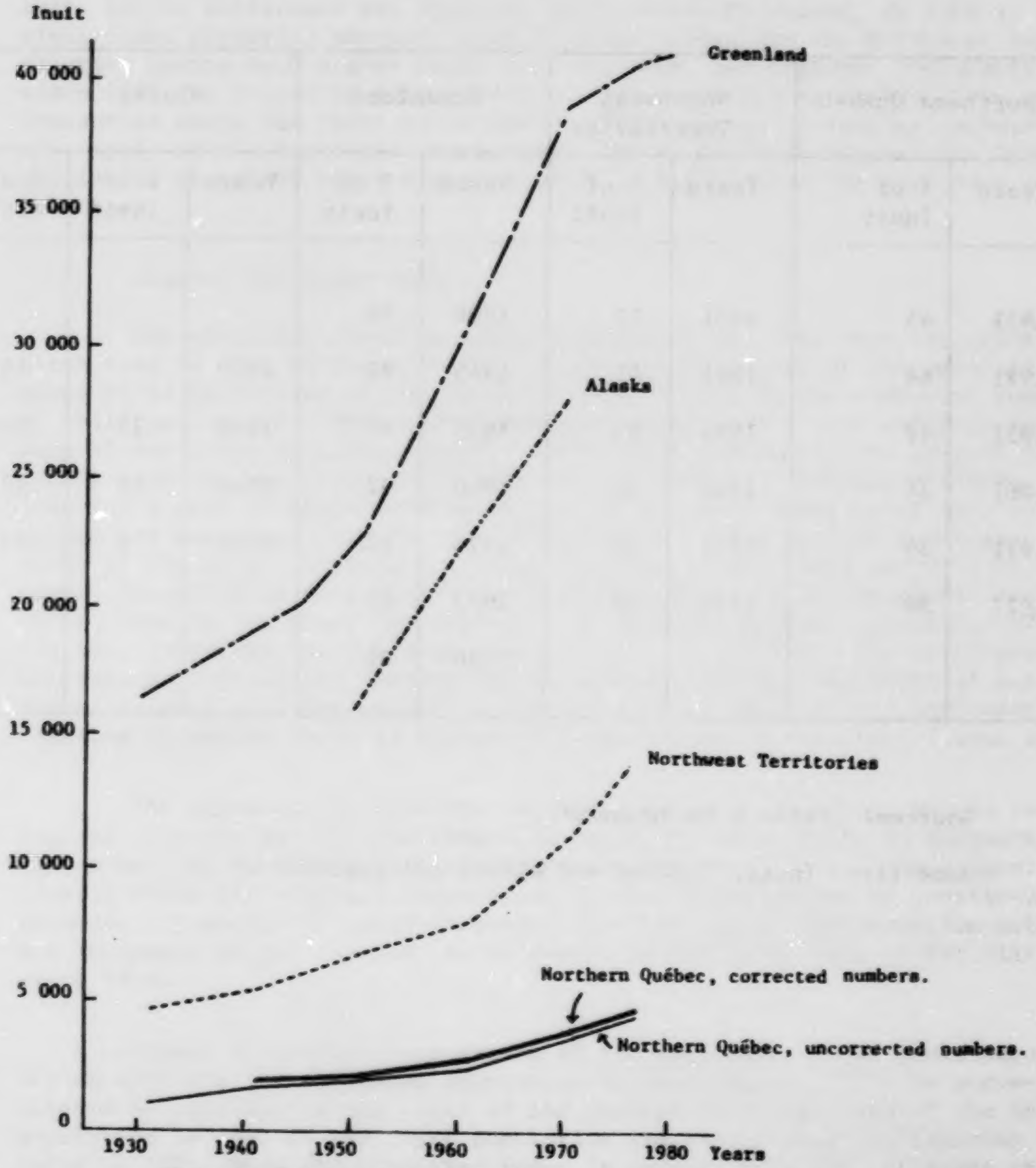
Table 1 shows that since 1930, the Inuit population as a proportion of the total population has declined substantially in the four regions despite this significant absolute increase. The Inuit proportion of the total population declined from 45 to 30% in Northern Québec, from 50 to 33% in the Northwest Territories, from 98 to 82% in Greenland and from 12 to 9% in Alaska. What are the reasons for this decline in the demographic weight of the Inuit population? An examination of the fertility, mortality and natural increase of the Inuit population, as well as the establishment of certain comparisons with the total population in the various regions, will permit a clearer identification of the problem and suggest some explanations.

Fertility

Crude Birth Rate -

Several indexes are used to measure fertility. The crude birth rate is the simplest but also the least specific, since it is influenced by the age structure of the population. This rate is calculated as the ratio of the

Figure 1. Numerical Evolution of the Inuit of Northern Québec, the Northwest Territories, Greenland and Alaska, 1930 to the present.



Sources: Table A of the Appendix.

Table 1. Evolution of the Inuit population as a proportion of the total population, Northern Québec, Northwest Territories, Greenland and Alaska, 1930 to the present.

Northern Québec		Northwest Territories		Greenland		Alaska		
Years	% of Inuit	Years	% of Inuit	Years	% of Inuit	Years	% of Inuit	% of Natives[1]
1931	45	1931	50	1930	98			
1941	64	1941	45	1945	98	1940		45
1951	48	1951	43	1951	95	1950	12	26
1961	34	1961	35	1960	92	1960	10	19
1971	39	1971	33	1970	84	1970	9	22
1977	30	1976	33	1977	82			
				1980	82			

Sources: Table A in appendix.

Note (1): Inuit, Indians and Aleuts all together .

annual average number of births recorded over a given period to the total population count in the middle of that period. Figure 2 shows that the rates of the Inuit in the four regions have evolved in a similar fashion despite differences of level. A rise in the rates from 1940 to 1960 was followed by a decline to the present period. Whereas between 1940 and 1955, little difference was apparent in the rates by region, in 1960 a significant disparity emerged, with Northern Québec and the Northwest Territories having much higher rates than the other two regions. Moreover, since 1960 the disparity between revised and unrevised rates has grown more pronounced among the Inuit of Northern Québec. Should a similar correction also apply to the Northwest Territories, the crude birth rate of its Inuit population in recent years might actually be higher than the one shown on the chart.

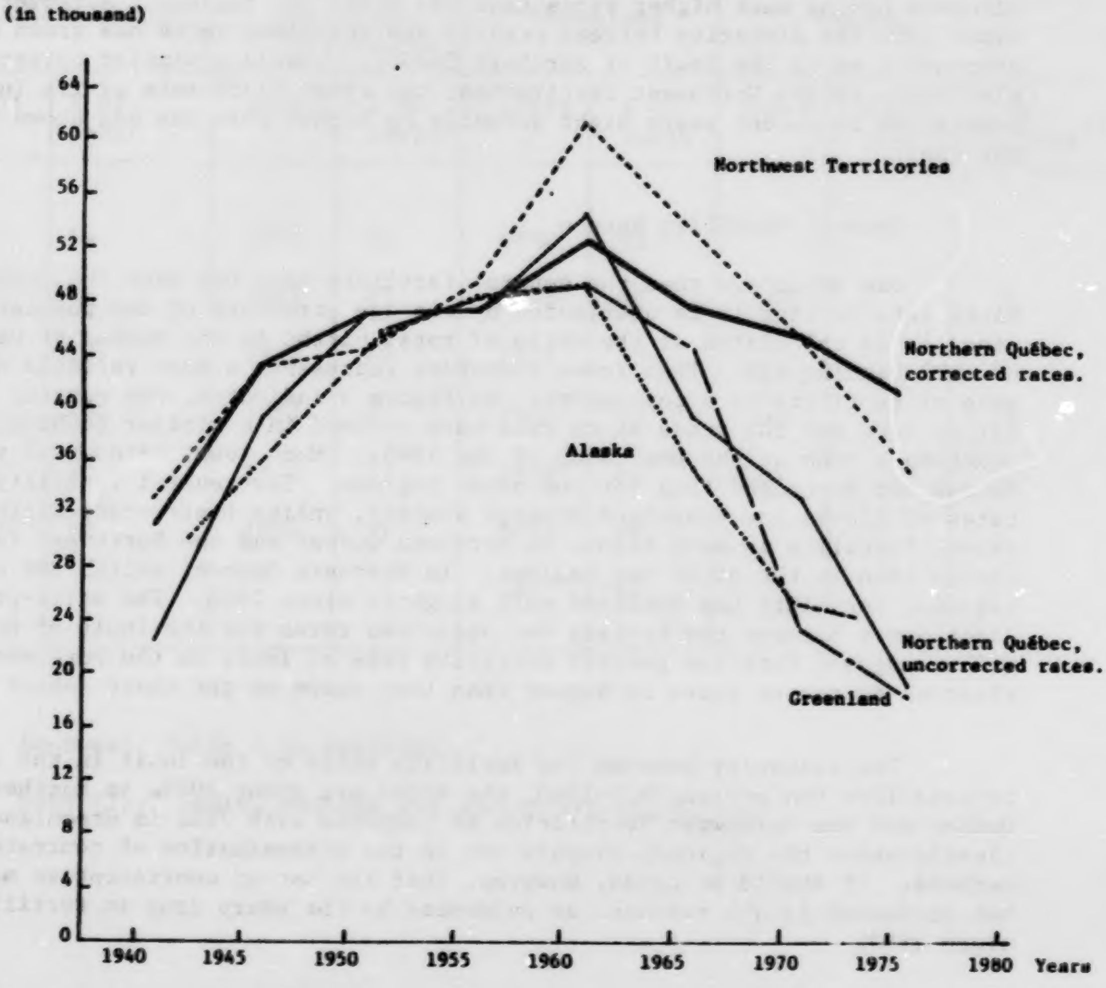
General Fertility Rate -

One advantage that the general fertility rate has over the crude birth rate is that it is unaffected by the age structure of the population, since it is calculated at the ratio of total births to the number of women of childbearing age. This index therefore represents a more reliable measure of fertility in a population. As Figure 3 indicates, the general fertility rate and the crude birth rate have evolved in a similar fashion, reaching a peak at the beginning of the 1960s. Much lower rates were recorded for Greenland than for the other regions. The general fertility rates of Alaska and Greenland diverge sharply, unlike their crude birth rates. Fertility is much higher in Northern Québec and the Northwest Territories than in the other two regions. In Northern Québec, unlike the other regions, fertility has declined only slightly since 1960. The still-present discrepancy between the revised and unrevised rates for the Inuit of Northern Québec suggest that the general fertility rate of Inuit in the Northwest Territories in recent years is higher than that shown on the chart (about 200‰).

The disparity between the fertility rates of the Inuit in the four regions (for the period 1975-1980, the rates are about 200‰ in Northern Québec and the Northwest Territories as compared with 72‰ in Greenland) clearly shows the regional disparities in the dissemination of contraceptive methods. It should be noted, however, that the use of contraceptive methods has increased in all regions, as evidenced by the sharp drop in fertility since 1960.

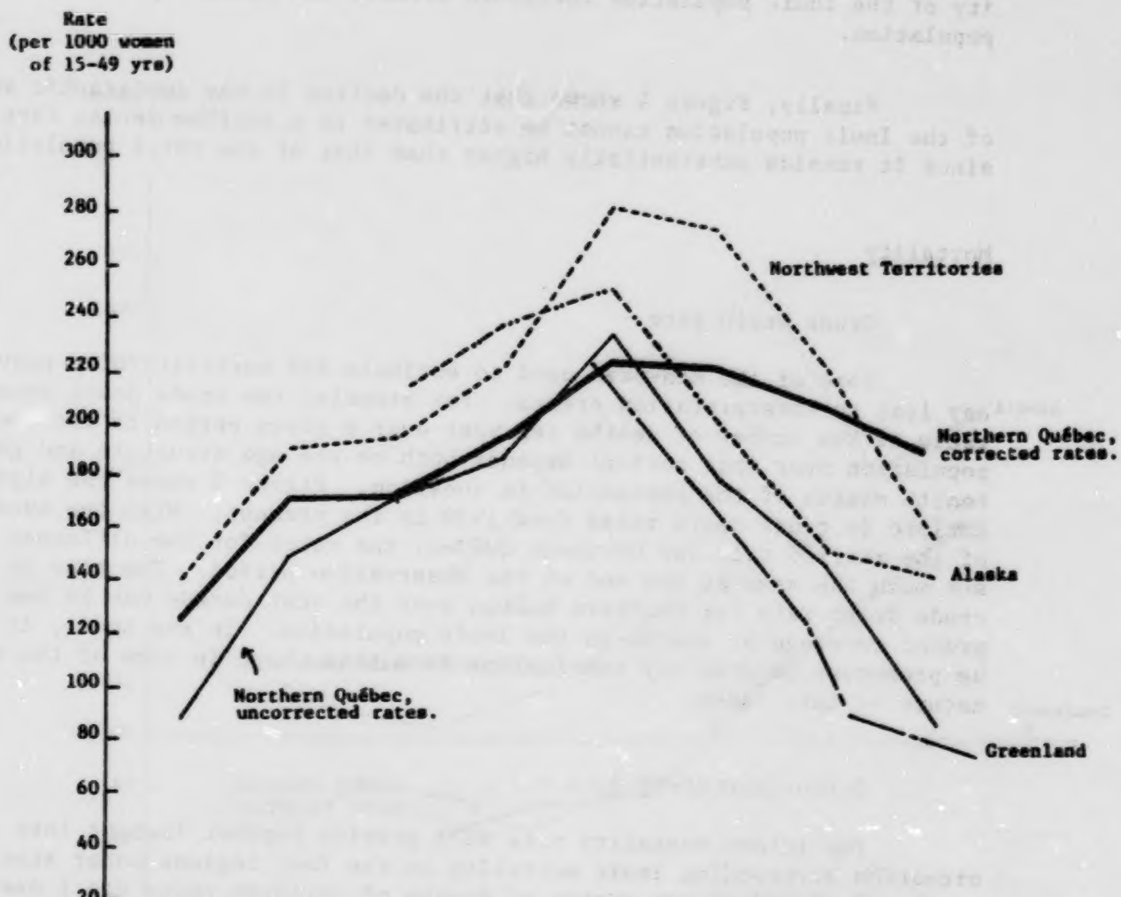
Figure 4 permits a comparison of the fertility of the Inuit population with that of the total population in each region. This is accomplished by calculating the ratio of the general fertility rate of the Inuit population to that of the total population and subsequently multiplying this ratio by 100. When the resulting index is greater than 100, it means that the fertility of the Inuit population is higher than that of the total population; when less than 100 it indicates the reverse. The results indicate that in general, the Inuit have higher fertility than the total population

Figure 2. Crude Birth Rates of the Inuit of Northern Québec, the Northwest Territories, Greenland and Alaska, 1940 to the present.



Sources: Table B of Appendix.

Figure 3. General Fertility Rates of the Inuit of Northern Québec, the Northwest Territories, Greenland and Alaska, 1940 to the present.



Sources: Table C of Appendix.

in each region. This statement has to be made with some reservation in the case of Northern Québec, since only the Inuit fertility rates were revised when in fact the total population rates are also likely to be in need of revision. In the case of Greenland the comparison is somewhat arbitrary: data on the total population are available for 1979 only, in which year the Inuit represented 82% of the total population. The fertility of the Inuit population therefore affects the fertility of the total population.

Finally, Figure 4 shows that the decline in the demographic weight of the Inuit population cannot be attributed to a decline in its fertility, since it remains substantially higher than that of the total population.

Mortality

Crude Death Rate -

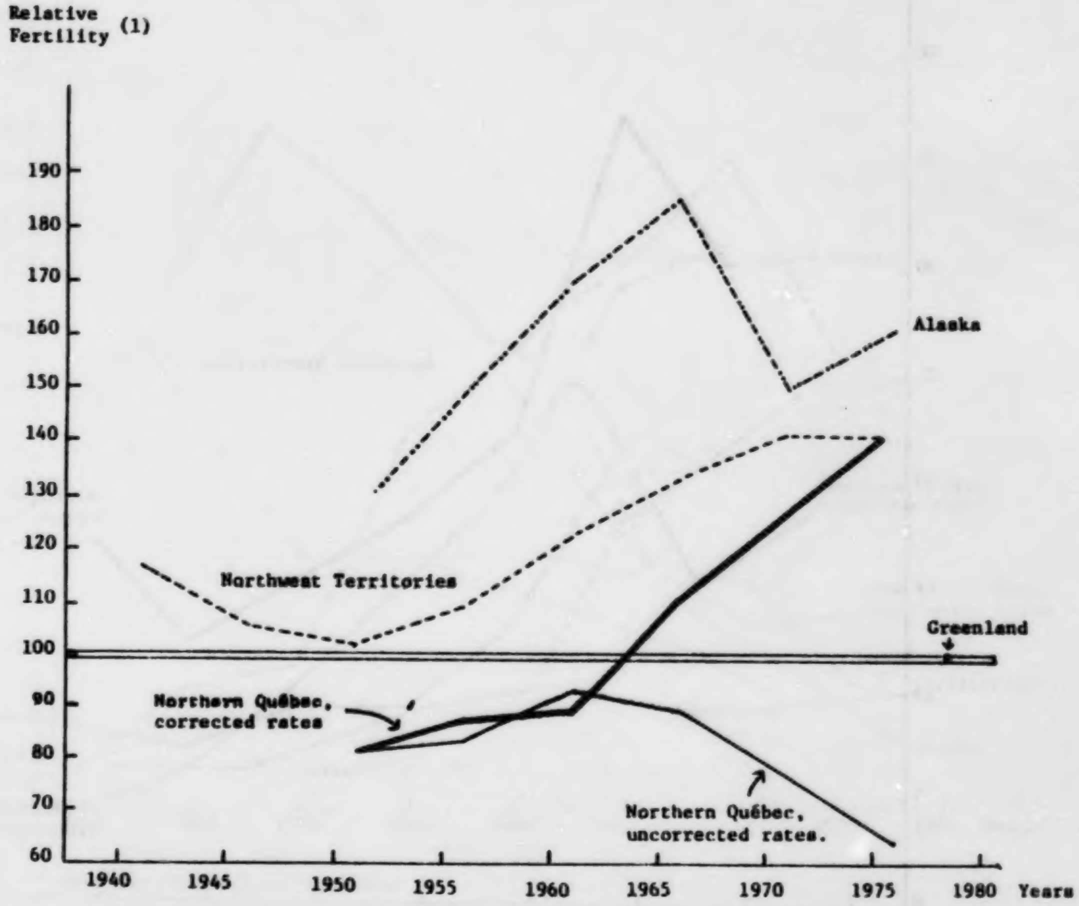
Some of the measures used to estimate the mortality of a population may lead to interpretation errors. For example, the crude death rate (the ratio of the number of deaths per year over a given period to the average population over that period) depends both on the age structure and general health status of the population in question. Figure 5 shows the significant decline in crude death rates from 1930 to the present. With the exception of the revised rate for Northern Québec, the rates for the different regions are much the same at the end of the observation period. The rise in the crude death rate for Northern Québec over the past decade may be due to improved coverage of deaths in the Inuit population. In any event, it would be premature to draw any conclusions from this chart in view of the ambiguous nature of this index.

Infant Mortality Rate -

The infant mortality rate will provide further insight into the situation surrounding Inuit mortality in the four regions under study. This rate, calculated as the number of deaths of children under age 1 over a given period divided by the number of births during that period, is unaffected by the age structure of the population and is an excellent indicator of social, economic and health conditions within a population. For Northern Québec, in addition to the unrevised and revised rates there are the infant mortality rates calculated by Jacques Légaré (1981) from information supplied by the Register, and a method of estimating the number of infant deaths not recorded in the vital statistics.

Figure 6 shows both the decline in infant mortality among the Inuit and the regional variations; however, the mortality differentials have declined significantly with time. With the exception of recent years, infant mortality trends in Northern Québec and the Northwest Territories have been

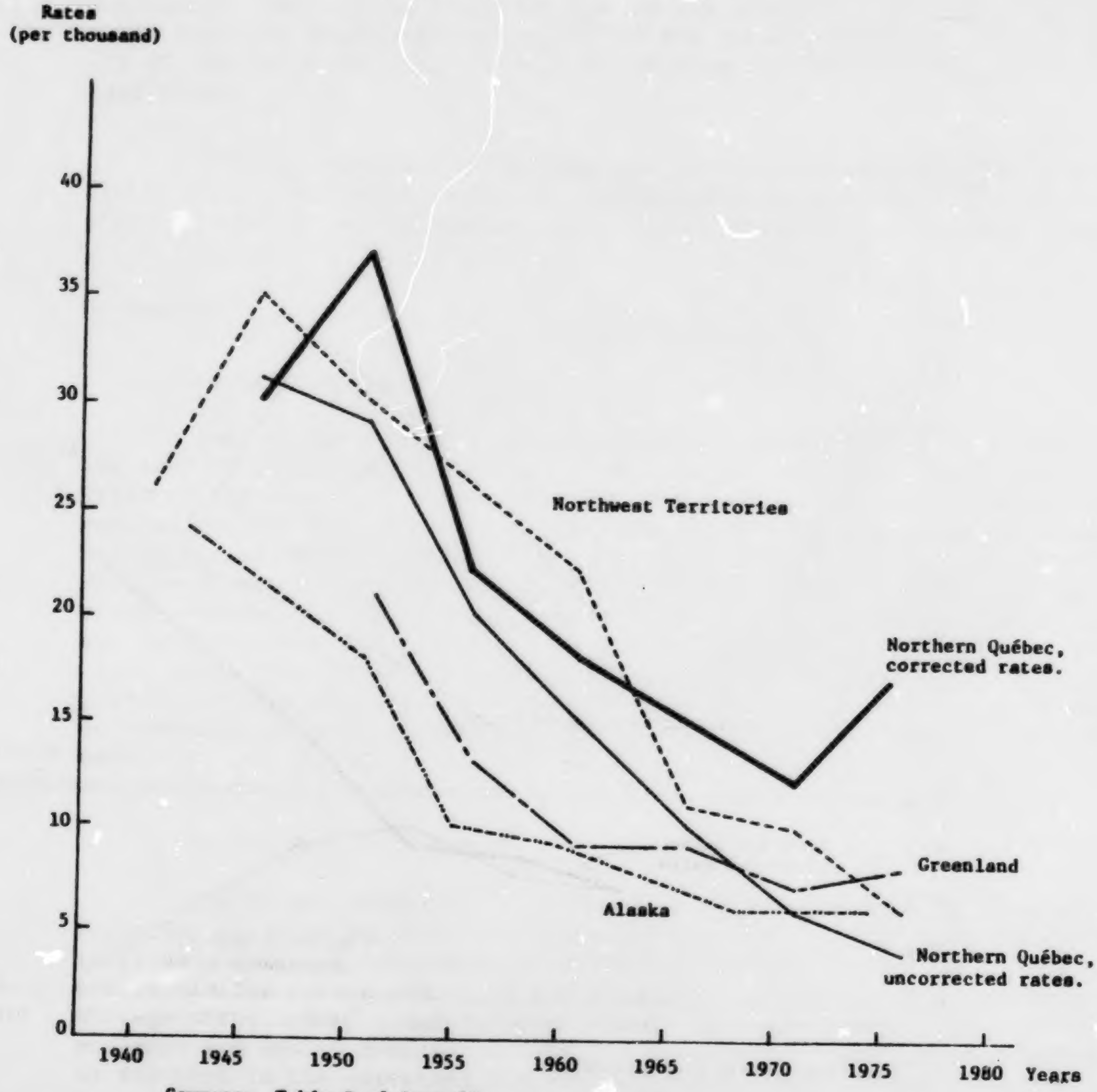
Figure 4. Fertility of the Inuit Population Relative to that of the Total Population, Northern Québec, Northwest Territories, Greenland and Alaska, 1940 to the Present.



Sources: Table C of Appendix.

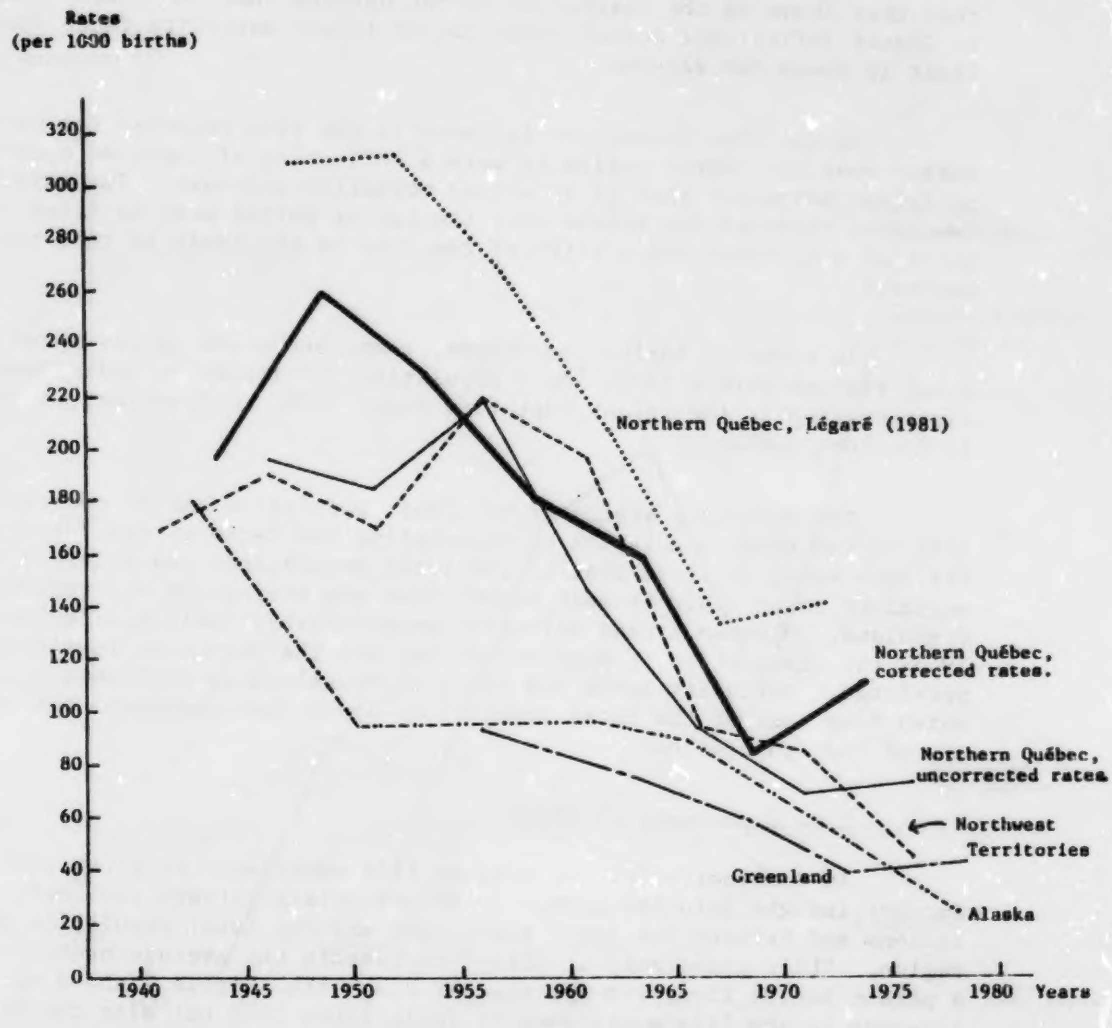
Note (1): Relative fertility = $\frac{\text{Total fertility rate of Inuit population}}{\text{Total fertility rate of total population}} \times 100$

Figure 5. Crude Death Rates of the Inuit of Northern Québec, the Northwest Territories, Greenland and Alaska, 1940 to the present.



Sources: Table D of Appendix.

Figure 6. Infant Mortality Rates of the Inuit of Northern Québec, the Northwest Territories, Greenland and Alaska, 1940 to the present.



Sources: Table E of Appendix.

somewhat similar. The Greenland and Alaska rates, which are much lower than those of the other two Canadian regions, have also evolved in a somewhat similar fashion. The similarities of the unrevised rates of Northern Québec and those of the Northwest Territories suggest that the actual infant mortality rate among the Inuit in the latter region is higher than that shown on the chart. It is our opinion that the values obtained by Légaré reflect the actual evolution of infant mortality rates among the Inuit in these two regions.

In all likelihood, the increase in the rate recorded for Northern Québec over the latter period is more a reflection of improved coverage of infant mortality than of an actual mortality increase. The extremely low level recorded for Alaska over the latter period must be taken with a grain of salt since the quality of the data on the Inuit in this region is unproven.

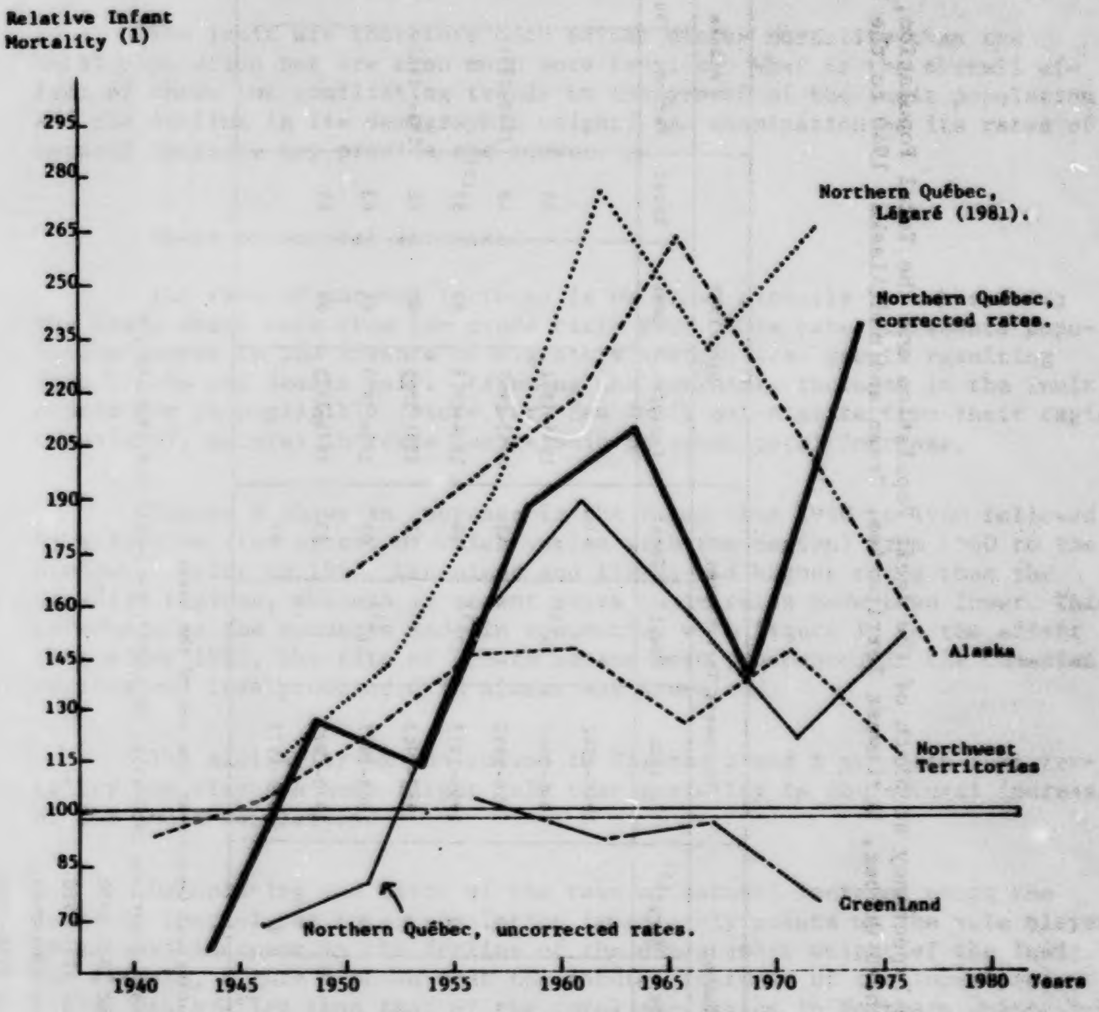
In terms of health conditions, then, Greenland is far ahead of the other regions with a large Inuit population - a situation underlined by the discrepancies in the infant mortality rates (40‰ in Greenland, about 140‰ in Northern Québec).

The mortality status of the Inuit population can be compared with that of the total population by calculating the ratio of the infant mortality rate among Inuit to that of the total population. As Figure 7 indicates, mortality among Inuit is much higher than the average in all regions except Greenland. Whereas excess mortality among Alaskan Inuit has declined since 1965, the disparities in Northern Québec and the Northwest Territories have persisted. Mortality among the Inuit of Greenland is difficult to distinguish from that of the total population, since they represent the vast majority of that population.

Life Expectancy at Birth -

An examination of the data on life expectancy at birth will provide further insight into the mortality differentials between the Inuit of various regions and between the Inuit population and the total population of each region. "Life expectancy at birth" represents the average number of years a person has to live from the time of his birth. Table 2 shows not only the increase in the life expectancy of Inuit since 1940 but also the disparities between regions and between the Inuit and total populations within each region. As can be seen, the life expectancies of the Inuit of Northern Québec and the Northwest Territories are almost identical, rising from 29 years around 1946 to 50 years in the mid-1960s. Similarly, Alaska and Greenland have identical life expectancies: 48 years in 1950 and 60 years in 1960. The Inuit of Canada therefore live 10 years less on the average than their Alaskan and Greenland counterparts.

Figure 7. Infant Mortality of the Inuit Population Relative to that of the Total Population, Northern Québec, Northwest Territories, Greenland and Alaska, 1940 to the present.



Sources: Table E of Appendix.

(1) Relative infant mortality = $\frac{\text{Infant mortality rate of Inuit population}}{\text{Infant mortality rate of total population}} \times 100$

Table 2. Life Expectancy at Birth of the Inuit Population and the Total Population, Northern Québec, Northwest Territories, Greenland and Alaska, 1940 to the Present.

Northern Québec			Northwest Territories			Greenland			Alaska		
Periods	Inuit	Total (1)	Periods	Inuit	Total	Periods	Inuit	Total	Periods	Natives	Total
			1940-1942		41						
1944-1948	29		1945-1947	29 (2)		1946-1951		36			
1949-1953	27	36	1950-1952		42	1952-1955		48	1949-1951	48	62
1954-1958	40	57	1955-1957	37 (3)	49	1954-1958	53	57 (5)			
1959-1963	46	64	1960-1962		51	1961-1965	60	60	1959-1961	60	
1964-1968	50	64	1965-1967	51 (4)	65	1966-1970	61	63			
1969-1973	52		1970-1972		63	1971-1975	62	62			
1974-1976		66	1975-1977		69						

Sources: See Statistical Sources at the end of the text.

Notes: (1) Consist of periods 1950-1952, 1955-1957, 1965-1967 and 1974-1976.

(2) Period 1941-1950.

(3) Period 1951-1960.

(4) Period 1963-1966.

(5) Period 1956-1960.

Inuit do not fair well relative to the total population: in both Canada and Alaska, their life expectancy is 14 years lower than that of the total population. The comparison remains somewhat problematical in the case of Greenland due to the relative importance of the Inuit population.

The Inuit are therefore much harder hit by mortality than the total population but are also much more fertile. What is the overall effect of these two conflicting trends on the growth of the Inuit population and the decline in its demographic weight? An examination of its rates of natural increase may provide the answer.

Rates of Natural Increase -

The rate of natural increase is obtained directly by subtracting the crude death rate from the crude birth rate. This rate represents population growth in the absence of migratory change, i.e. growth resulting from births and deaths only. Assuming the migratory increase in the Inuit population is negligible (since very few Inuit out-migrate from their region of origin), natural increase can be said to equal total increase.

Figure 8 shows an increase in the rates from 1940 to 1960 followed by a decline (the extent of which varies with the region) from 1960 to the present. Prior to 1960, Greenland and Alaska had higher rates than the Canadian regions, whereas in recent years their rates have been lower. This corroborates the comments made in connection with Figure 1, to the effect that after 1960, the rate of growth became more pronounced in the Canadian regions and less pronounced in Alaska and Greenland.

The similarity of the curves in Figures 2 and 8 suggests that fertility has played a much larger role than mortality in the natural increase of the Inuit population.

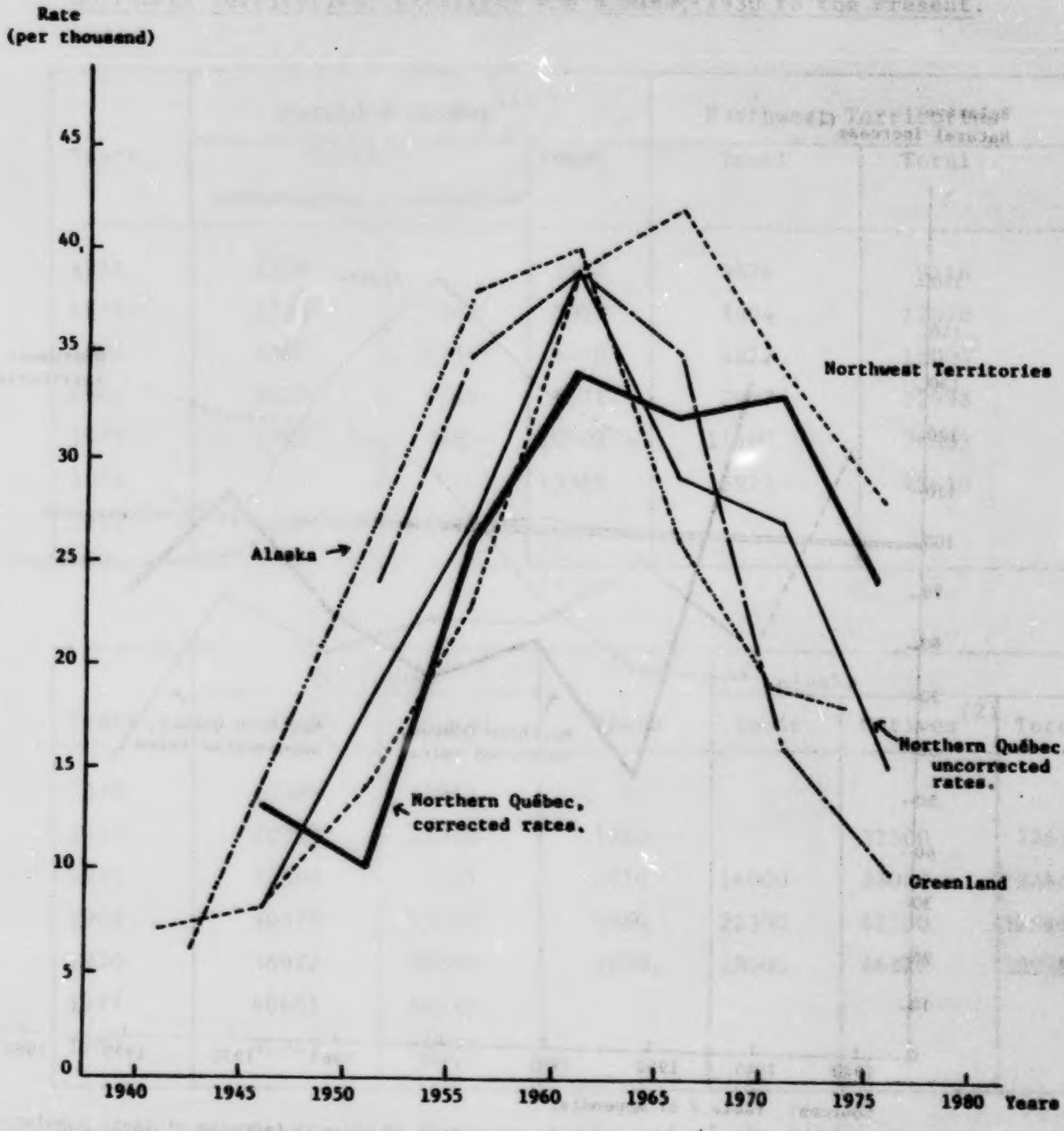
Calculating the ratio of the rate of natural increase among the Inuit to that of the total population immediately points up the role played by natural increase in the decline of the demographic weight of the Inuit. For example, Figure 9 shows that the natural increase of the Inuit population was smaller than that of the total population in Northern Québec but larger in the Northwest Territories (after 1960) and in Alaska (over the whole period). In Greenland, the Inuit rate was slightly above average up until the mid 1960s and lower thereafter.

Conclusion

Whereas in Northern Québec, the decline in the size of the Inuit population relative to that of the total population can be attributed in part to natural increase, such is not the case in the other regions, where

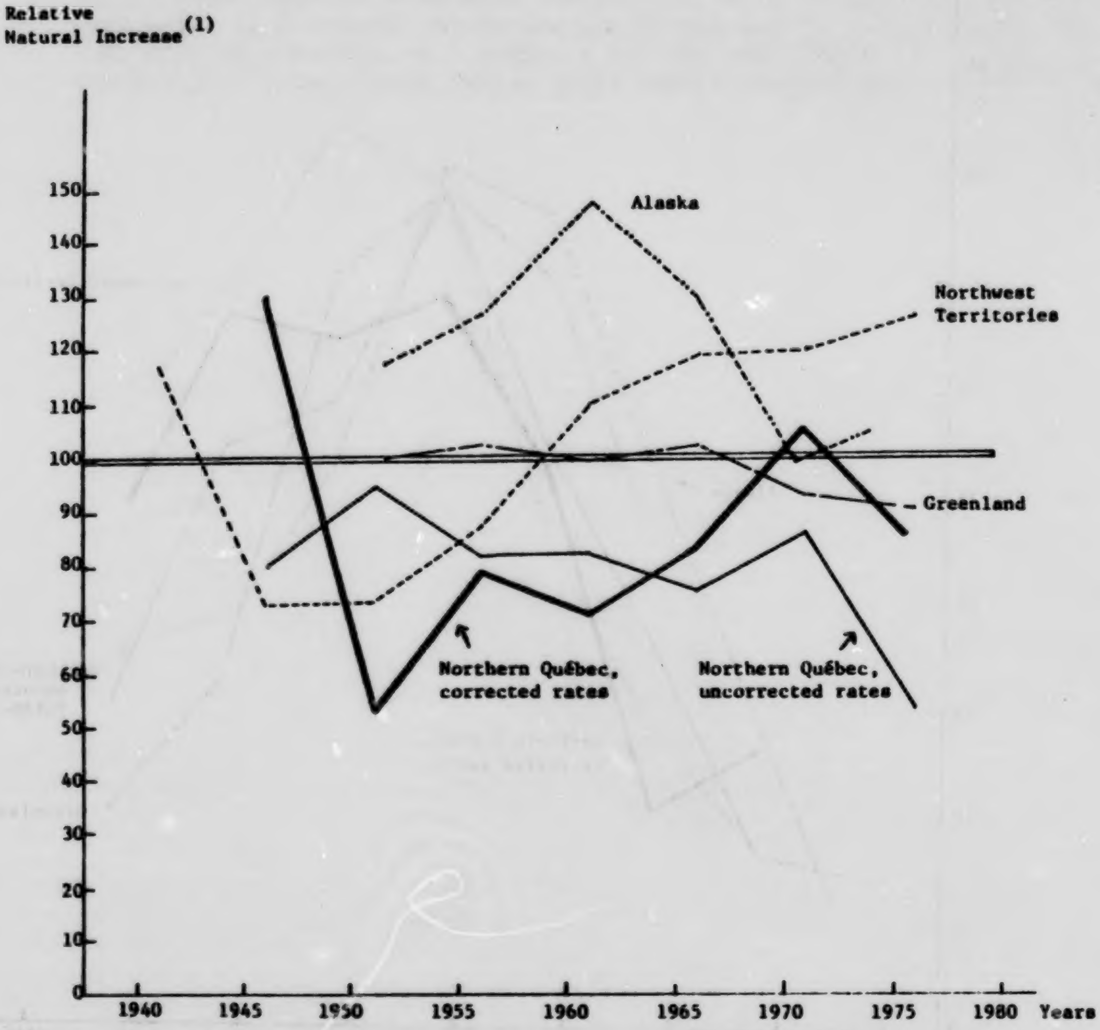
the decline in the demographic weight of the Inuit population is due to a migratory increase of the non-Inuit population. This trend can be expected to become more pronounced in the coming years in Northern Québec, the Northwest Territories and Alaska due to the increasing development of natural resources in these regions and the influx of non-Inuit manpower. Unlike these regions, Greenland should experience an increase in the Inuit proportion of its total population due to the May 1979 adoption of the *Home Rule* guaranteeing this region a certain administrative and political independence from Denmark, which could reduce the migratory influx of Danes.

Figure 8. Rate of Natural Increase of the Inuit of Northern Québec, the Northwest Territories, Greenland and Alaska, 1940 to the Present.



Sources: Table F of Appendix.

Figure 9. Natural Increase of the Inuit Population Relative to that of the Total Population, Northern Québec, Northwest Territories, Greenland and Alaska, 1940 to the present.



Sources: Table F of Appendix.

Note: (1) Relative natural increase = $\frac{\text{Rate of natural increase of Inuit population}}{\text{Rate of natural increase of total population}} \times 100$

APPENDIX A

Table A

Inuit Population and Total Population, Northern Québec, Northwest Territories, Greenland and Alaska, 1930 to the Present.

Years	Northern Québec (1) Inuit uncorrected	Northern Québec (1) Inuit corrected	Northern Québec (1) Total	Northwest Territories Inuit	Northwest Territories Total
1931	1159		2584	4670	9316
1941	1778	1959	3067	5404	12028
1951	1989	2165	4470	6822	16004
1961	2467	2768	8121	7977	22998
1971	3755	3915	10002	11400	34805
1976			15369	13922	42610
1977	4532	4626			

Years	Greenland Inuit	Greenland Total	Years	Alaska Inuit	Alaska Natives (2)	Alaska Total
1930	16488	16901				
1945	20939	21412	1940		32500	72524
1951	22890	24159	1950	16000	34000	128643
1960	30378	33140	1960	22300	42500	226167
1970	38912	46532	1970	28000	66382	300382
1977	40601	49719				
1980	40947	49773				

Sources: See Statistical Sources at the end of the text.

Notes: (1) From 1931 to 1971, census sub-division of Northern Québec. Since 1976, Health Statistical Area of Northern Québec.

(2) Inuit, Indians and Aleuts.

Table B

Crude Birth Rates of the Inuit and the Total Population, Northern Québec, Northwest Territories, Greenland and Alaska, 1940 to the Present (Rate per 1000)

Periods	Northern Québec			Northwest Territories	
	Rates			Rates	
	Inuit uncorrected	Inuit corrected	Total	Inuit	Total
1939-1943	22	31	25	33	26
1944-1948	39 (1)	43	43 (1)	43 (1)	39 (1)
1949-1953	47	47	44	44	40
1954-1958	47 (1)	47	45	49 (1)	41
1959-1963	54	52	57	61	48
1964-1968	39 (1)	47	45	53	43
1969-1973	33	45	37 (3)	45	36
1974-1978	19 (1)	41 (2)	32 (4)	35	27

Periods	Greenland		Periods	Alaska	
	Rates			Rates	
	Inuit	Total		Natives	Total
1941-1945		40	1943	30	
1946-1949		41 (1)			
1950-1953	45	44	1950-1953	45	31
1954-1958	48	47	1954-1958	48 (1)	35
1959-1963	49	48	1959-1963	49	32
1964-1968	44	42	1964-1968	35 (1)	25
1969-1973	23	23	1969-1972	25	24
1974-1978	18	18	1973-1975	24	21

Sources: See Statistical Sources at the end of the text.

Notes: (1) Estimate of the total population obtained from a linear interpolation between two censuses.

(2) Period from 1/1/1974 to 30/6/1977. (3) Period 1969-1972.
(4) Period 1973-1975.

Table C

General Fertility Rates of the Inuit Population and the Total Population, Northern Québec, Northwest Territories, Greenland and Alaska, 1940 to the Present (Rates per 1000 Females Ages 15-49)

Periods	Northern Québec			Northwest Territories	
	Rates			Rates	
	Inuit		Total	Inuit	Total
	uncorrected	corrected			
1939-1943	88	124		140	120
1944-1948	149 (1)	170		190 (1)	180 (1)
1949-1953	171	171	211	194	190
1954-1958	187 (1)	194	224	221 (1)	203
1959-1963	234	223	251	281	230
1964-1968	177 (1)	220	198	273 (1)	206
1969-1973	145	206		222	158
1974-1978	85	188 (2)	132 (3)	157	111

Periods	Greenland		Alaska		
	Rates		Periods	Rates	
	Inuit	Total		Natives (5)	Total
			1950-1953	214	163
			1954-1958	237	159 (1)
1960	223		1959-1963	250	147
1970	124		1964-1968	199	107 (1)
1972-1973	89		1969-1973	150	100
1978-1979	72	71 (4)	1974-1978	140	87 (6)

Sources: See Statistical Sources at the end of the text.

Notes: (1) Estimate of the female population aged 15-49 years, obtained from a linear interpolation of the size of generations between two censuses.

(2) Period of 1/1/1974 to 30/6/1977.

(3) Period 1973-1974. (4) 1979.

(5) Rates calculated from the female population aged 15-44.

(6) Estimate of the female population aged 15-49 years, obtained from a linear extrapolation of the size of generations at the 1970's census.

Table D

Crude Death Rates of the Inuit Population and the Total Population, Northern Québec, Northwest Territories, Greenland and Alaska, 1940 to the Present (Rate per 1,000 persons).

Periods	Northern Québec			Northwest Territories	
	Rates			Rates	
	Inuit		Total	Inuit	Total
	uncorrected	corrected			
1939-1943			25	26	20
1944-1948	31(1)	30	34(1)	35(1)	28(1)
1949-1953	29	37	25	30	35
1954-1958	20(1)	22	12	26(1)	15
1959-1963	15	18	10	22	13
1964-1968	10(1)	15	7	11	8
1969-1973	6	12	6(3)	10(3)	7
1974-1978	4(1)	17(2)	4(4)	6(5)	5

Periods	Greenland		Periods	Alaska	
	Rates			Rates	
	Inuit	Total		Natives	Total
1941-1945		20	1943	24	
1946-1949		26(1)			
1950-1953	21	20	1950-1953	18(6)	8
1954-1958	13	13	1954-1958	10(7)	5
1959-1963	9	9	1959-1963	9(8)	5
1964-1968	9	8	1964-1968	9(9)	5
1969-1973	7	6	1969-1972	6(10)	5
1974-1978	8	7	1973-1975	6(11,12)	4

Sources: See Statistical Sources at the end of the text.

Notes: (1) (2) (3) (4): See notes for Table 2.
(5): 1976.
(6): 1951. (7): 1955. (8): 1960.
(9): Period 1965-1966. (10): Period 1968-1969.
(11): Period 1974-1975.
(12): Population estimate according to a linear interpolation at the 1970 census.

Table E

Infant Mortality Rates of the Inuit Population and the Total Population, Northern Québec, Northwest Territories, Greenland and Alaska, 1940 to the Present (Rate per 1,000 Births).

Periods	Northern Québec				Northwest Territories	
	Rates				Rates	
	Inuit			Total	Inuit	Total
	uncorrected	corrected (1)	Légaré (1981) (2)			
1939-1943				214	168	154
1944-1948	196	197	308	235	191	162
1949-1953	185	258	312	197	169	125
1954-1958	218	227	267	129	220	137
1959-1963	145	180	206	71	196	121
1964-1968	93	153	133	54	94	67
1969-1973	68	83	140	50 (3)	84	52
1974-1978	73	111		44 (4)	43	33

Periods	Greenland		Periods	Alaska	
	Rates			Rates	
	Inuit	Total		Natives	Total
			1943	180	
1946-1951		156	1950	95	52
1952-1955		93	1957-1958		38
1954-1958	93	79 (6)	1959-1963	96	41 (7)
1961-1965	74	70	1964-1967	89	32
1966-1970	59	53	1968-1971		20
1971-1975	39	44	1972-1975		18
1978-1979	42		1977-1979	24	

Sources: See Statistical Sources at the end of the text.

Notes: (1) Periods from 1/6/1941 to 31/5/1946, 1/6/1946 to 31/5/1951, 1/6/1951 to 31/5/1956, 1/6/1956 to 31/5/1961, 1/6/1961 to 31/5/1966, 1/6/1966 to 31/5/1971 and 1/6/1971 to 30/6/1977.

(2) Periods 1945-1949, 1950-1954, 1955-1959, 1960-1964, 1965-1969 and 1970-1974.

(3) Period 1969-1972. (4) Period 1973-1975.

(5) Rates average according to sex. (6) Period 1956-1960.

(7) Period 1959-1960.

Table F

Rate of Natural Increase of the Inuit Population and the Total Population, Northern Québec, Northwest Territories, Greenland and Alaska, 1940 to the Present (Rate per 1,000 Persons).

Periods	Northern Québec			Northwest Territories	
	Rates			Rates	
	Inuit		Total	Inuit	Total
	uncorrected	corrected			
1939-1943			0	7	6
1944-1948	8	13	10	8	11
1949-1953	18	10	19	14	19
1954-1958	27	26	33	23	26
1959-1963	39	34	47	39	35
1964-1968	29	32	38	42	35
1969-1973	27	33	31(2)	35(2)	29
1974-1978	15	24(1)	28(3)	28	22

Periods	Greenland		Periods	Alaska	
	Rates			Rates	
	Inuit	Total		Natives	Total
1941-1945		20	1943	6	
1946-1949		15			
1950-1953	24	24	1950-1953	27	23
1954-1958	35	34	1954-1958	38	30
1959-1963	39	39	1959-1963	40	27
1964-1968	35	34	1964-1968	26	20
1969-1973	16	17	1969-1972	19	19
1974-1978	10	11	1973-1975	18	17

Sources: Tables 2 and 4.

Notes: (1), (2) and (3): See notes (2), (3) and (4) for Table 2.

APPENDIX B

Statistical Sources

Inuit of Northern Québec

Uncorrected rates: Births, total deaths and infant mortality: Vital statistics, REGISTRE DE LA POPULATION DES INUIT DU NOUVEAU-QUÉBEC, DÉPARTEMENT DE DÉMOGRAPHIE, UNIVERSITÉ DE MONTRÉAL.

Total population and female population aged 15-49: Censuses of Canada, DOMINION BUREAU OF STATISTICS and STATISTICS CANADA; Registered List of the Commission d'Inscription, 1977, JAMES BAY AND NORTHERN QUÉBEC AGREEMENT.

Corrected rates and life expectancy at birth: REGISTRE DE LA POPULATION DES INUIT DU NOUVEAU-QUÉBEC, DÉPARTEMENT DE DÉMOGRAPHIE, UNIVERSITÉ DE MONTRÉAL.

Infant mortality rates calculated by Jacques Légaré: LÉGARÉ (1981), page 8.

Total population of Northern Québec

Births, total deaths and infant deaths, 1930 to 1972: Vital statistics, DOMINION BUREAU OF STATISTICS and STATISTICS CANADA.

Total population, 1931 to 1971: Censuses of Canada, DOMINION BUREAU OF STATISTICS and STATISTICS CANADA.

Population by age, 1951 to 1966: Table de mortalité abrégée selon les régions administratives, 1950-52, 1955-57, 1960-62 et 1965-67, BUREAU DE LA STATISTIQUE DU QUÉBEC, Volume 9.

Deaths by age, 1950-52 to 1965-67: Les causes de décès au Québec suivant les groupes d'âges, régions administratives, BUREAU DE LA STATISTIQUE DU QUÉBEC, Volume 2.

Live birth rates, total general fertility rates, crude death rates, infant mortality rates, 1973-1975 period: Statistiques des Affaires Sociales, MINISTÈRE DES AFFAIRES SOCIALES DU QUÉBEC.

Inuit of the Northwest Territories

Total births and deaths and deaths by age, 1939 to 1951: Vital Statistics, DOMINION BUREAU OF STATISTICS; 1952 to 1964: VÈZINA (1967).

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Total population and population by age, 1976: HAMELIN (1979), page 12.

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HAMELIN (1979), page 11.

Crude death rates, 1976: HAMELIN (1979), page 11.

Life expectancy at birth, 1963-1966 period: Life Expectancy of Canadian Eskimos, DEPARTMENT OF NATIONAL HEALTH AND WELFARE.

Total Population of the Northwest Territories

Total births and deaths and deaths by age: Vital Statistics, DOMINION BUREAU OF STATISTICS and STATISTICS CANADA.

Total population and population by age: Censuses of Canada, DOMINION BUREAU OF STATISTICS and STATISTICS CANADA.

Natives (Inuit) of Greenland

Grønland Kalaallit Nunaat, MINISTERIET FOR GRØNLAND.

Total Population of Greenland

Total births and deaths, 1941-1949: Statistiske Meddelser, Befolfningens bevaegelser, 1974, Danmarks Statistik.

Total births and deaths, 1950-1978, total population, total general fertility rate, 1979: Grønland Kalaallit Nunaat, MINISTERIET FOR GRØNLAND.

Infant mortality rate and life expectancies at birth: HANSEN (1980), page 512.

Native Peoples (Inuit, Indians and Aleuts) of Alaska

Births and total general fertility rates: BLACKWOOD (1981), page 175.

Total deaths, 1968-1969 and 1974-1975 periods: Vital Statistics of the United States, UNITED STATES DEPARTMENT OF HEALTH AND WELFARE.

Total Inuit population: 1950 and 1970: BONE (1973), page 554. 1960: GURUNANJAPPA (1969), page 65.

Total native population: 1950 and 1960: GURUNANJAPPA (1969), pages 65-66. 1940 and 1970: MILAN (1980), page 19.

Live birth rates, 1943: MILAN (1980), page 16.

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Life expectancies at birth: GURUNANJAPPA (1969), page 66.

Total Population of Alaska

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Evolution démographique des Inuit du Nouveau-Québec, des Territoires du Nord-Ouest, du Groënland et de l'Alaska, de 1930 à nos jours.

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Introduction

Toute étude basée sur la connaissance statistique des Inuit des différentes régions nordiques se heurte à deux obstacles: le manque de données et la qualité souvent douteuse des sources disponibles. Bien qu'ayant eu à faire face à ces deux problèmes, nous avons tenté, à partir d'indices couramment utilisés en démographie, de brosser un tableau sommaire de l'évolution démographique des Inuit pour les quatre régions où ils se concentrent. Cette opération permettra, d'un côté, de comparer les caractéristiques démographiques des Inuit habitant des régions différentes, et de l'autre côté, à l'intérieur de chacune des régions étudiées, de situer la position des Inuit par rapport à l'ensemble de la population.

Les sources

La qualité et la disponibilité des données se rapportant aux Inuit, varient d'une région à l'autre. Pour le Nouveau-Québec, les indices ont été calculés d'une part, à partir des données brutes fournies directement par les actes d'état civil et les recensements, d'autre part, selon les informations provenant du Registre de la population des Inuit, élaboré au Département de démographie de l'Université de Montréal(1). Ce registre assure une plus grande couverture de la population inuit du Nouveau-Québec, puisqu'il recueille plus de renseignements que les sources traditionnelles. Ainsi, Louise Normandeau et Jacques Légaré (1979) ont montré, que pour certaines années, le nombre de naissances retracées par toutes les sources disponibles pouvait être le double de celui obtenu à partir uniquement des actes d'état civil. Pour la majorité des indices se rapportant aux Inuit du Nouveau-Québec, nous aurons donc deux valeurs, l'une non-corrigée, calculée d'après les données fournies par les sources officielles, l'autre dite corrigée, et estimée à partir des informations contenues dans le registre des Inuit. Les valeurs non-corrigées permettront d'établir une

(1) Pour plus de renseignements, consulter CHOINIÈRE R. et ROBITAILLE, N. (1982).

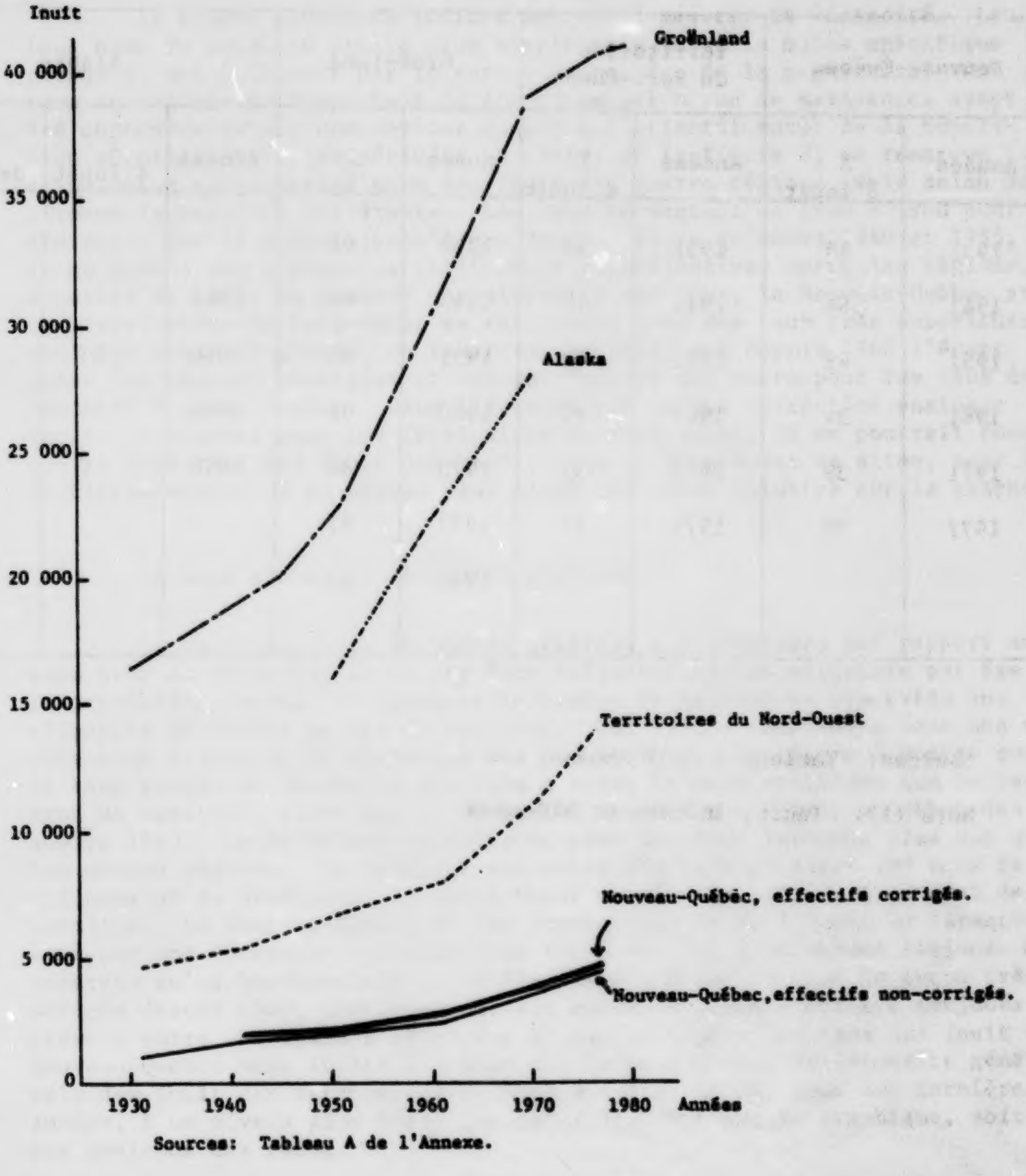
comparaison avec les indices calculés pour les Inuit des Territoires du Nord-Ouest, puisque les données se rapportant à cette dernière population, proviennent, elles aussi, des actes d'état civil et des recensements. Etant donné la dispersion géographique des Inuit des Territoires du Nord-Ouest, la couverture, par les sources officielles, des événements démographiques touchant cette population, devrait être aussi incomplète qu'au Nouveau-Québec. Les valeurs corrigées serviront, d'un autre côté, à illustrer plus fidèlement la situation démographique des Inuit du Nouveau-Québec, et à établir des comparaisons avec celle des Inuit du Groënland dont la couverture semble être très bonne. Il est à noter que dans cette région, on associe la population inuit aux natifs du Groënland, étant donné le haut degré de métissage de cette population et la quasi-impossibilité de rejoindre les individus d'origine inuit par une définition adéquate (Hansen, 1980). Finalement, en ce qui a trait aux données sur les Inuit de l'Alaska, elles ne concernent que les effectifs totaux de population. Nous avons donc utilisé les données se rapportant aux natifs de cette région, qui comprennent les Inuit, les Aléouts et les Indiens, alors que les Inuit forment près de la moitié de ce groupe. De plus, étant donné la proximité géographique et sociale de ces trois peuples, les indices calculés pour les natifs devraient donner une bonne idée des caractéristiques démographiques des Inuit de l'Alaska.

L'accroissement de la population

A partir de la figure 1, on constate que la population inuit des différentes régions a augmenté de façon importante de 1930 à nos jours. Au Nouveau-Québec, durant cette période, les Inuit ont quadruplé leurs effectifs, alors que dans les Territoires du Nord-Ouest et au Groënland le nombre d'Inuit a presque triplé. En Alaska et au Groënland, l'accroissement de la population inuit a été plus marqué avant 1960, et surtout durant la décennie de 1950. Il est intéressant de noter que l'accroissement des effectifs des Inuit du Groënland a été très faible depuis 1970. A l'opposé de ces deux régions, les Inuit du Nouveau-Québec et des Territoires du Nord-Ouest ont vu leur rythme d'accroissement s'intensifier après 1960. Mais alors que ce rythme est resté constant pour les Territoires du Nord-Ouest depuis ce temps, on observe une légère baisse pour le Nouveau-Québec durant la période 1971-1977.

Malgré cette hausse considérable des effectifs inuit depuis 1930, le tableau 1 montre que dans les quatre régions, leur importance relative par rapport à l'ensemble de la population, a subi une nette diminution durant cette période. Ainsi, la proportion d'Inuit est passée de 45 à 30% au Nouveau-Québec, de 50 à 33% dans les Territoires du Nord-Ouest, de 98 à 82% au Groënland et de 12 à 9% en Alaska. A quels facteurs doit-on attribuer cette baisse du poids démographique des Inuit? L'examen de la fécondité, de la mortalité et de l'accroissement naturel des Inuit, ainsi que l'établissement de certaines comparaisons avec l'ensemble de la population des diverses régions, permettront de mieux cerner le problème, et de proposer quelques explications.

Figure 1. Evolution numérique des Inuit du Nouveau-Québec, des Territoires du Nord-Ouest, du Groënland et de l'Alaska, 1930 à nos jours.



Sources: Tableau A de l'Annexe.

Tableau 1. Evolution de l'importance relative des Inuit par rapport à l'ensemble de la population, Nouveau-Québec, Territoires du Nord-Ouest, Groënland et Alaska, 1930 à nos jours.

Nouveau-Québec		Territoires du Nord-Ouest		Groënland		Alaska		
Années	% d'Inuit	Années	% d'Inuit	Années	% d'Inuit	Années	% d'Inuit	% de natifs (1)
1931	45	1931	50	1930	98			
1941	64	1941	45	1945	98	1940		45
1951	48	1951	43	1951	95	1950	12	26
1961	34	1961	35	1960	92	1960	10	19
1971	39	1971	33	1970	84	1970	9	22
1977	30	1976	33	1977	82			
				1980	82			

Sources: Tableau A de l'Annexe.

Note (1): Inuit, Indiens et Aléoutes.

La fécondité

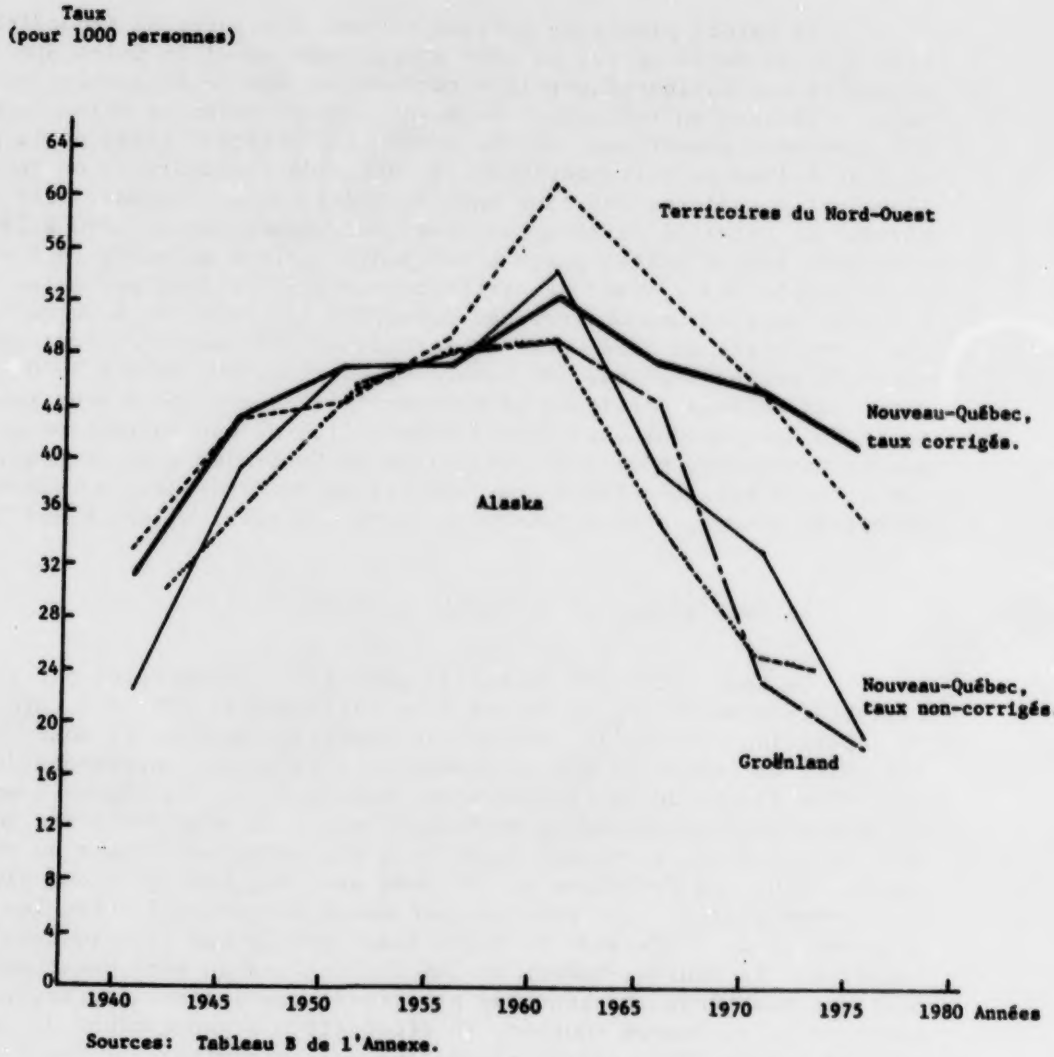
Le taux brut de natalité -

Il existe plusieurs indices servant à mesurer la fécondité. Le taux brut de natalité est le plus simple mais aussi le moins spécifique puisqu'il est influencé par la structure par âge de la population. Ce taux se calcule en rapportant le nombre annuel moyen de naissances ayant été observées durant une période donnée à l'effectif total de la population au milieu de cette période. A partir de la figure 2, on remarque l'évolution analogue des taux des Inuit des quatre régions, mais selon des niveaux de natalité différents. Les taux augmentent de 1940 à 1960 pour diminuer, par la suite, jusqu'à nos jours. Alors qu'entre 1940 et 1955, il ne semble pas y avoir de différences significatives entre les régions, à partir de 1960, on observe une disparité des taux, le Nouveau-Québec et les Territoires du Nord-Ouest se retrouvant avec des taux très supérieurs aux deux autres régions. On remarque, de plus, que depuis 1960 l'écart entre les valeurs corrigées et non-corrigées s'est accru pour les taux des Inuit du Nouveau-Québec. Dans l'éventualité où une correction analogue serait pertinente pour les Territoires du Nord-Ouest, il se pourrait donc que le taux réel des Inuit des Territoires du Nord-Ouest se situe, pour les dernières années, à un niveau plus élevé que celui illustré sur le graphique.

Le taux global de fécondité générale -

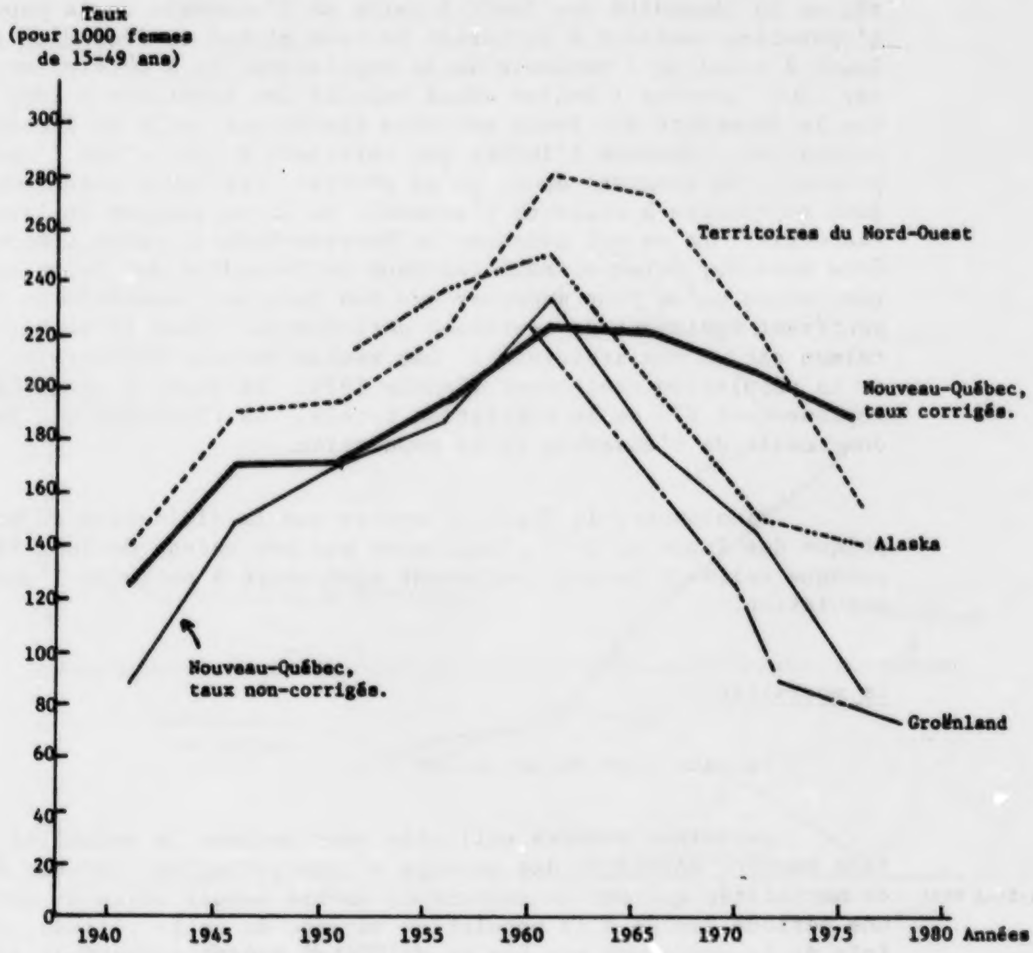
Le taux global de fécondité générale a l'avantage, par rapport au taux brut de natalité, de ne pas être influencé par la structure par âge de la population, puisqu'il rapporte le nombre de naissances observées aux effectifs de femmes en âge de procréer. Cet indice représente donc une mesure plus fiable de la fécondité des populations. La figure 3 montre que le taux global de fécondité générale a suivi la même évolution que le taux brut de natalité, alors que la fécondité atteint son sommet au début des années 1960. Le Groënland se retrouve avec des taux beaucoup plus bas que les autres régions. On remarque une nette distinction entre les taux de l'Alaska et du Groënland, ce qui n'était pas le cas pour le taux brut de natalité. Le Nouveau-Québec et les Territoires du Nord-Ouest se caractérisent par une fécondité beaucoup plus forte que les deux autres régions. On constate qu'au Nouveau-Québec, la fécondité n'a pas diminué de façon très marquée depuis 1960, contrairement aux autres régions. L'écart toujours présent entre les valeurs corrigées et non-corrigées des taux des Inuit du Nouveau-Québec nous incite à penser que le taux global de fécondité générale des Inuit des Territoires du Nord-Ouest se situe, pour les dernières années, à un niveau plus élevé que celui illustré sur le graphique, soit aux environs des 200‰.

Figure 2. Taux bruts de natalité des Inuit du Nouveau-Québec, des Territoires du Nord-Ouest, du Groënland et de l'Alaska, 1940 à nos jours.



Sources: Tableau B de l'Annexe.

Figure 3. **Taux globaux de fécondité générale des Inuit du Nouveau-Québec, des Territoires du Nord-Ouest, du Groënland et de l'Alaska, 1940 à nos jours.**



Sources: Tableau C de l'Annexe.

L'écart entre les taux de fécondité des Inuit des quatre régions - pour la période 1975-1980, les taux sont de l'ordre de 200% au Nouveau-Québec et dans les Territoires du Nord-Ouest et de 72% au Groënland - montre bien les disparités régionales dans la diffusion des moyens contraceptifs. Cependant, il faut noter que l'utilisation de méthodes contraceptives s'est accrue dans toutes les régions, étant donné la chute marquée de la fécondité depuis 1960.

A partir de la figure 4, il est possible de comparer pour chaque région la fécondité des Inuit à celle de l'ensemble de la population. L'opération consiste à rapporter le taux global de fécondité générale des Inuit à celui de l'ensemble de la population, et à multiplier ce rapport par 100. Lorsque l'indice ainsi calculé est supérieur à 100, cela signifie que la fécondité des Inuit est plus élevée que celle de l'ensemble de la population. Lorsque l'indice est inférieur à 100, c'est l'inverse qui se produit. On constate donc, qu'en général, les Inuit possèdent une fécondité supérieure à celle de l'ensemble de la population de leur territoire respectif. En ce qui concerne le Nouveau-Québec, cette affirmation doit être nuancée, puisque seuls les taux de fécondité des Inuit ont été corrigés, alors qu'on peut supposer que les taux de l'ensemble de la population souffrent également de certaines déficiences. Pour le Groënland, la comparaison est un peu arbitraire. Les seules données disponibles pour l'ensemble de la population concernent l'année 1979. De plus, à cette date, les Inuit représentent 82% de la population totale. La fécondité des Inuit influence donc celle de l'ensemble de la population.

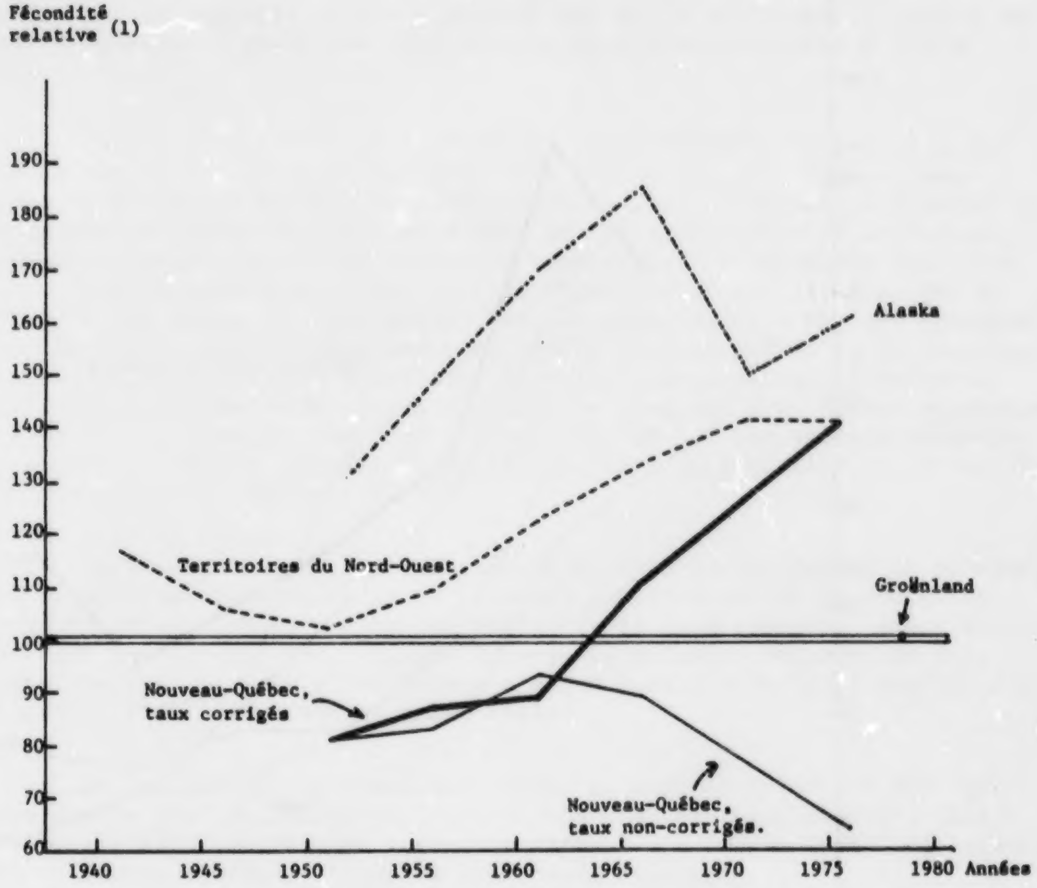
Finalement, la figure 4 montre que la diminution du poids démographique des Inuit ne peut s'expliquer par une baisse de leur fécondité puisque celle-ci demeure nettement supérieure à celle de l'ensemble de la population.

La mortalité

Le taux brut de mortalité -

Certaines mesures utilisées pour estimer la mortalité d'une population peuvent entraîner des erreurs d'interprétation. Ainsi, le taux brut de mortalité, qui est le rapport du nombre annuel moyen de décès durant une période donnée à la population moyenne de cette période, dépend à la fois de la structure par âge et de l'état sanitaire général de la population étudiée. Sur la figure 5, on remarque la chute importante des taux de 1930 à nos jours. A l'exception du taux corrigé du Nouveau-Québec, les taux semblent les mêmes, d'une région à l'autre, à la fin de la période d'observation. La hausse du taux brut de mortalité observée pour le Nouveau-Québec durant la dernière décennie, peut dépendre d'une meilleure couverture des décès de la population inuit. Quoiqu'il en soit, il serait hasardeux de tirer des conclusions de ce graphique, étant donné le caractère ambigu de cet indice.

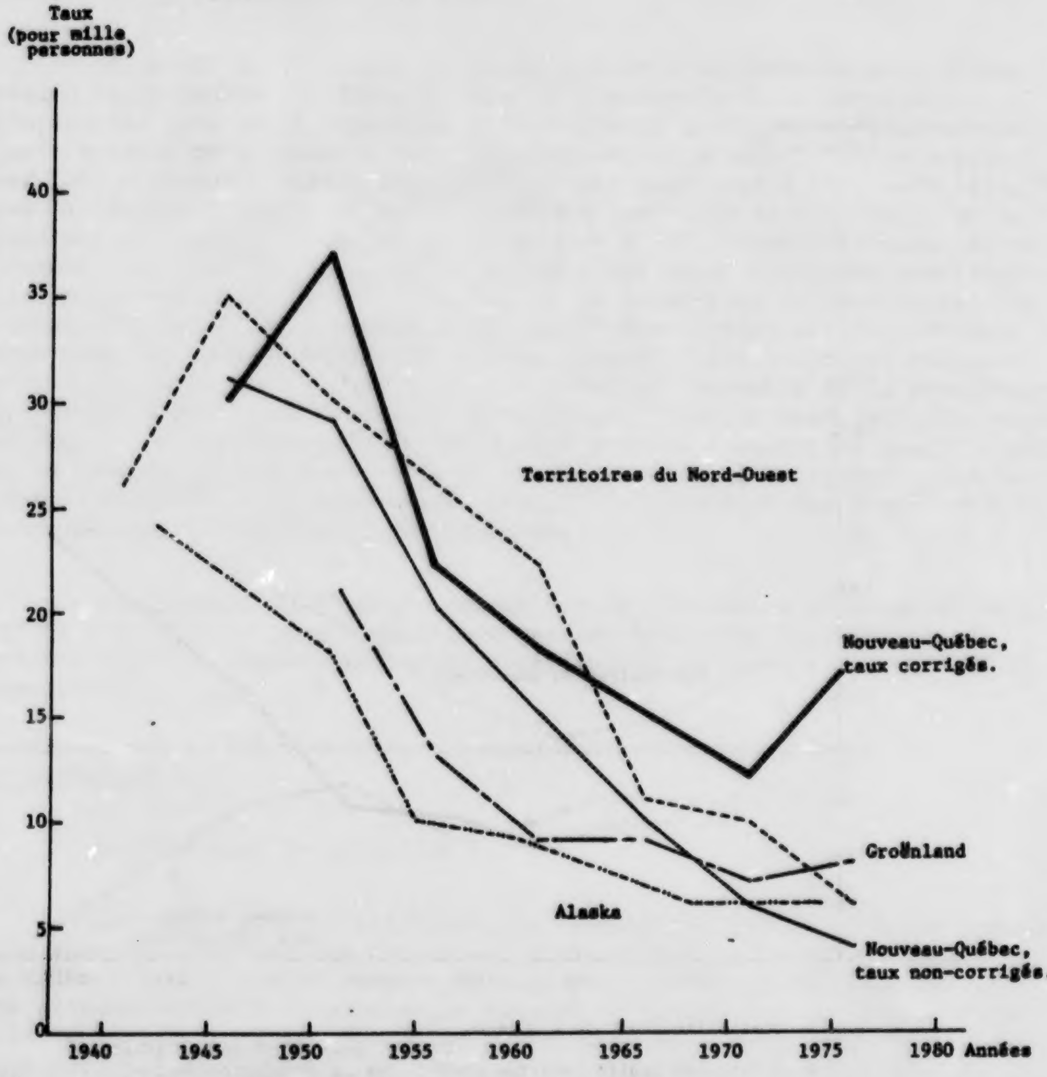
Figure 4. Fécondité relative[1] des Inuit par rapport à l'ensemble de la population, Nouveau-Québec, Territoires du Nord-Ouest, Groënland et Alaska, 1940 à nos jours.



Sources: Tableau C de l'Annexe.

Note (1): $\text{Fécondité relative} = \dfrac{\text{Taux globaux de fécondité générale de la population inuit}}{\text{Taux globaux de fécondité générale de l'ensemble de la population}} \times 100$

Figure 5. Taux bruts de mortalité des Inuit du Nouveau-Québec, des Territoires du Nord-Ouest, du Groënland et de l'Alaska, 1940 à nos jours.



Sources: Tableau D de l'Annexe.

Le taux de mortalité infantile -

Le taux de mortalité infantile va permettre de mieux saisir la situation des Inuit des quatre régions étudiées, en ce qui a trait à la mortalité. Ce taux, qui représente le nombre de décès d'enfants de moins d'un an, durant une période donnée, divisé par le nombre de naissances durant la même période, n'est pas affecté par la structure par âge de la population et constitue un excellent indicateur des conditions sociales, économiques et sanitaires d'une population. Pour le Nouveau-Québec, en plus des taux non-corrigés et corrigés, on retrouve les taux de mortalité infantile calculés par Jacques Légaré (1981) à partir de renseignements fournis par le registre et d'une méthode permettant d'estimer le nombre de décès infantiles n'ayant pas fait l'objet d'un enregistrement à l'état civil.

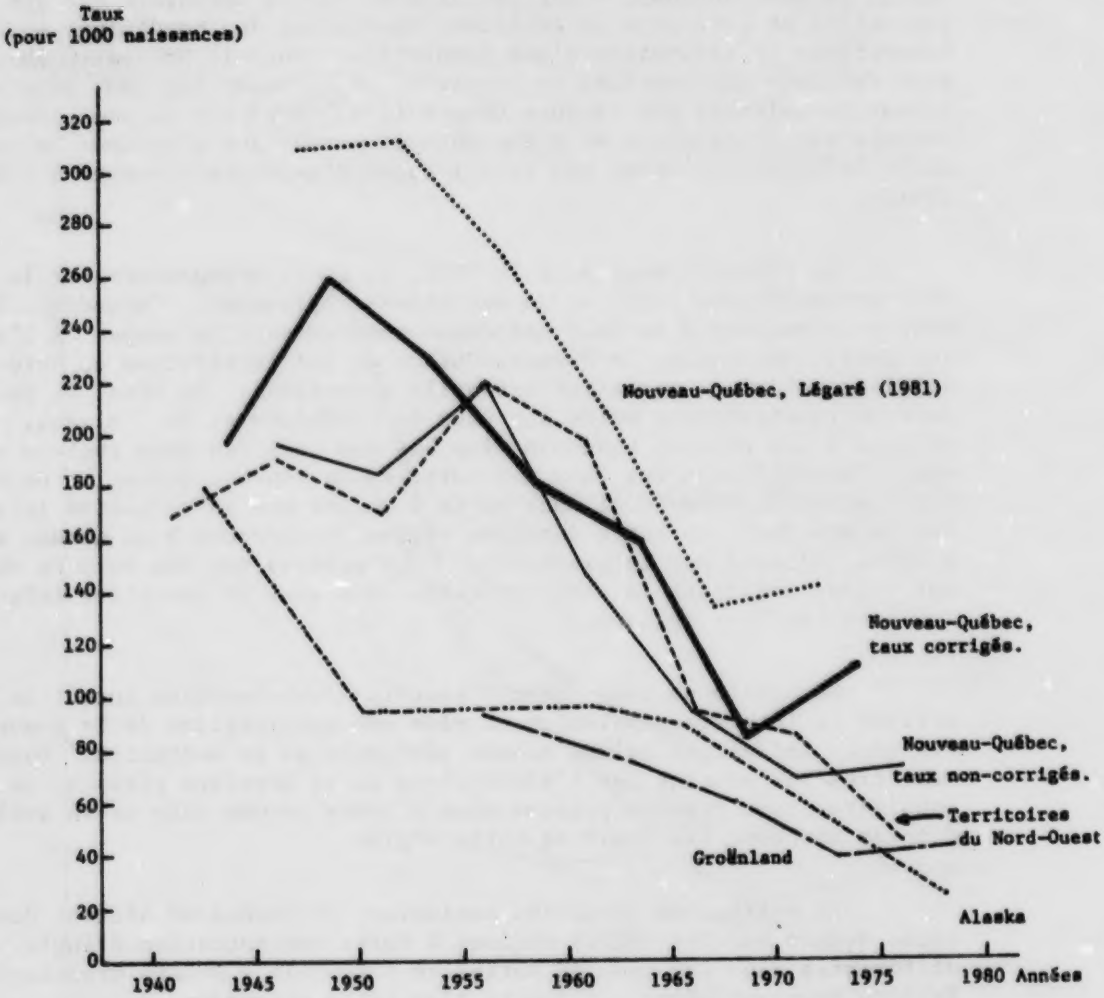
La figure 6 montre, à la fois, la chute enregistrée par la mortalité infantile des Inuit et les variations régionales. Cependant, les écarts de mortalité se sont nettement réduits avec le temps. A l'exception des dernières années, le Nouveau-Québec et les Territoires du Nord-Ouest semblent subir une mortalité infantile comparable. De même, on peut établir un rapprochement entre les taux du Groënland et de l'Alaska, qui se situent à des niveaux beaucoup plus bas que ceux des deux régions canadiennes. La similitude des taux non-corrigés du Nouveau-Québec et de ceux des Territoires du Nord-Ouest nous porte à croire que la mortalité infantile réelle des Inuit de cette dernière région se retrouve à un niveau supérieur à celui illustré sur le graphique. Nous pensons que les valeurs obtenues par Légaré reflètent la position réelle des taux de mortalité infantile des Inuit de ces deux régions.

La hausse du taux observé pour le Nouveau-Québec durant la dernière période reflète vraisemblablement plus une amélioration de la couverture des décès infantiles qu'une hausse véritable de la mortalité. Quant au niveau très bas atteint par l'Alaska lors de la dernière période, on doit le considérer avec réserve puisque nous n'avons aucune idée de la qualité des données touchant les Inuit de cette région.

En matière de condition sanitaire, le Groënland détient donc une bonne avance sur les autres régions à forte concentration d'Inuit. Les différences dans les taux de mortalité infantile - 40‰ au Groënland, environ 140‰ au Nouveau-Québec - illustre bien cette situation.

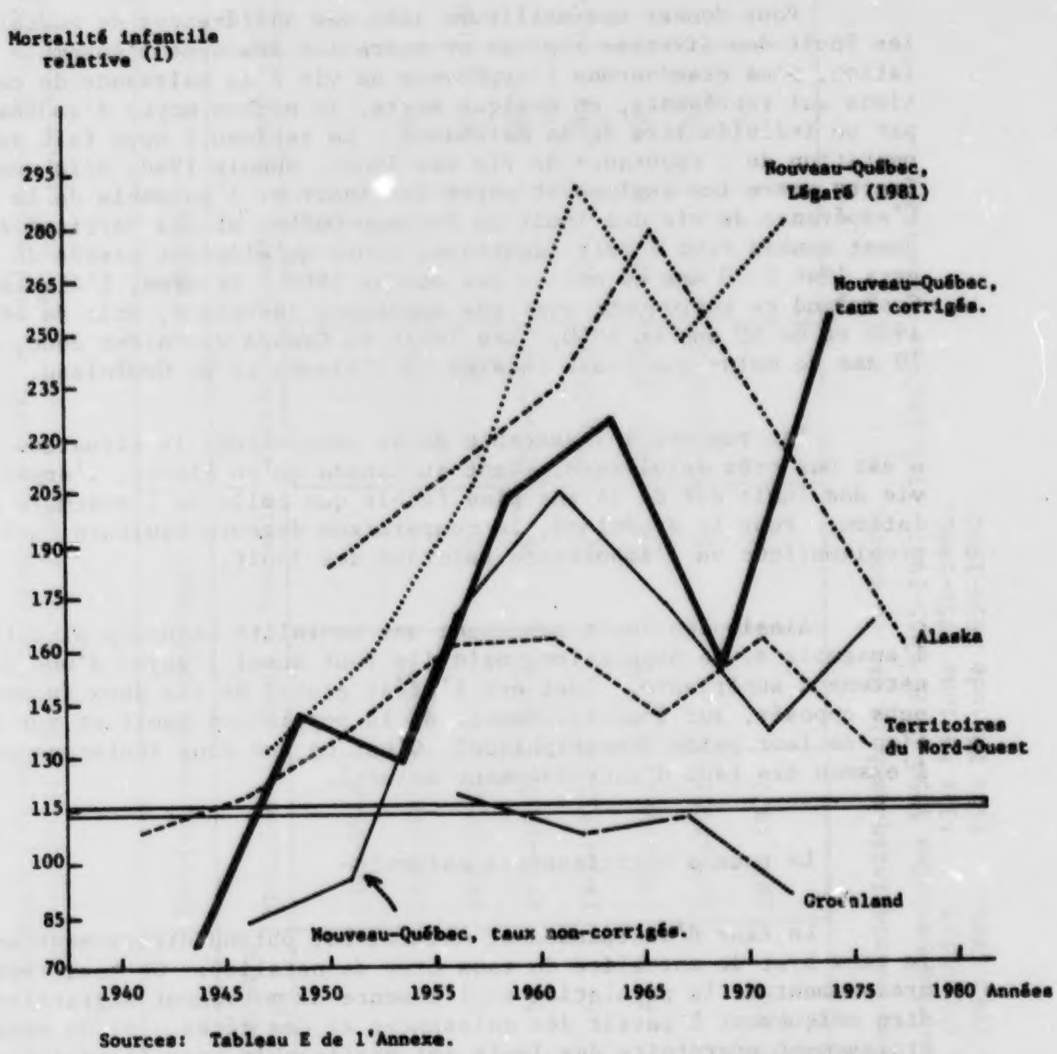
En rapportant le taux de mortalité infantile des Inuit à celui de l'ensemble de la population, il est possible de situer la position relative des Inuit par rapport à la population totale, face à la mortalité. On constate sur la figure 6, qu'à l'exception du Groënland, la mortalité des Inuit est nettement plus forte que la moyenne. Alors qu'en Alaska, la surmortalité des Inuit a diminué depuis 1965, l'écart ne semble pas se résorber

Figure 6. Taux de mortalité infantile des Inuit du Nouveau-Québec, des Territoires du Nord-Ouest, du Groënland et de l'Alaska, 1940 à nos jours.



Sources: Tableau E de l'Annexe.

Figure 7. Mortalité infantile relative(1) des Inuit par rapport à l'ensemble de la population, Nouveau-Québec, Territoires du Nord-Ouest, Groënland et Alaska, 1940 à nos jours.



Sources: Tableau E de l'Annexe.

(1) Mortalité infantile relative = $\frac{\text{Taux de mortalité infantile de la population inuit}}{\text{Taux de mortalité infantile de l'ensemble de la population}} \times 100$

au Nouveau-Québec et dans les Territoires du Nord-Ouest. Au Groënland, la mortalité des Inuit ne peut se différencier nettement de l'ensemble puisque ceux-ci représentent la grande majorité de la population.

Espérance de vie à la naissance -

Pour donner une meilleure idée des différences de mortalité entre les Inuit des diverses régions et entre les Inuit et l'ensemble de la population, nous examinerons l'espérance de vie à la naissance de ces populations qui représente, en quelque sorte, le nombre moyen d'années à vivre par un individu lors de sa naissance. Le tableau 2 nous fait voir l'augmentation de l'espérance de vie des Inuit, depuis 1940, mais aussi les écarts entre les régions et entre les Inuit et l'ensemble de la population. L'espérance de vie des Inuit du Nouveau-Québec et des Territoires du Nord-Ouest semble tout à fait identique, alors qu'elle est passée de 29 ans vers 1946 à 50 ans au milieu des années 1960. De même, l'Alaska et le Groënland se retrouvent avec une espérance identique, soit de 48 ans en 1950 et de 60 ans en 1960. Les Inuit du Canada vivraient donc, en moyenne, 10 ans de moins que leurs cousins de l'Alaska et du Groënland.

Par rapport à l'ensemble de la population, la situation des Inuit n'est pas très reluisante. Tant au Canada qu'en Alaska, l'espérance de vie des Inuit est de 14 ans plus faible que celle de l'ensemble de la population. Pour le Groënland, la comparaison demeure toujours quelque peu problématique vu l'importance relative des Inuit.

Ainsi, les Inuit subissent une mortalité beaucoup plus forte que l'ensemble de la population, mais ils font aussi l'objet d'une fécondité nettement supérieure. Quel est l'effet global de ces deux facteurs, de sens opposés, sur l'accroissement de la population inuit et sur la diminution de leur poids démographique? C'est ce que nous tenterons de voir par l'examen des taux d'accroissement naturel.

Le taux d'accroissement naturel -

Le taux d'accroissement naturel est obtenu directement en soustrayant le taux brut de mortalité du taux brut de natalité. Ce taux représente l'accroissement de la population en l'absence de mouvement migratoire, c'est-à-dire uniquement à partir des naissances et des décès. Si on admet que l'accroissement migratoire des Inuit est négligeable, par l'hypothèse d'une absence de mouvement migratoire des Inuit hors de leur région respective, l'accroissement naturel devient l'accroissement total.

Tableau 2. Espérance de vie à la naissance des Inuit et de l'ensemble de la population, Nouveau-Québec, Territoires du Nord-Ouest, Groënland et Alaska, 1940 à nos jours.

Nouveau-Québec			Territoires du Nord-Ouest			Groënland			Alaska		
Périodes	Inuit	Ensemble (1)	Périodes	Inuit	Ensemble	Périodes	Inuit	Ensemble	Périodes	Natifs	Ensemble
			1940-1942		41						
1944-1948	29		1945-1947	29(2)		1946-1951		36			
1949-1953	27	36	1950-1952		42	1952-1955		48	1949-1951	48	62
1954-1958	40	57	1955-1957	37(3)	49	1954-1958	53	57(5)			
1959-1963	46	64	1960-1962		51	1961-1965	60	60	1959-1961	60	
1964-1968	50	64	1965-1967	51(4)	65	1966-1970	61	63			
1969-1973	52		1970-1972		63	1971-1975	62	62			
1974-1976		66	1975-1977		69						

Sources: Voir les sources statistiques à la fin du texte.

Notes: (1): Il s'agit des périodes 1950-1952, 1955-1957, 1965-1967 et 1974-1976.
(2): Période 1941-1950. (3): Période 1951-1960.
(4): Période 1963-1966. (5): Période 1956-1960.

On constate de la figure 8, une hausse des taux de 1940 à 1960 suivie d'une baisse, plus ou moins marquée selon les régions, de 1960 à nos jours. Avant 1960, le Groënland et l'Alaska se distinguent par des taux plus élevés que les régions canadiennes, alors que pour les dernières périodes, ils se retrouvent avec des taux inférieurs. Ceci correspond d'ailleurs aux remarques formulées à partir de la figure 1, alors que les régions canadiennes voyaient leur rythme de croissance s'intensifier après 1960 tandis que l'Alaska et le Groënland enregistraient durant cette période une baisse de leur rythme.

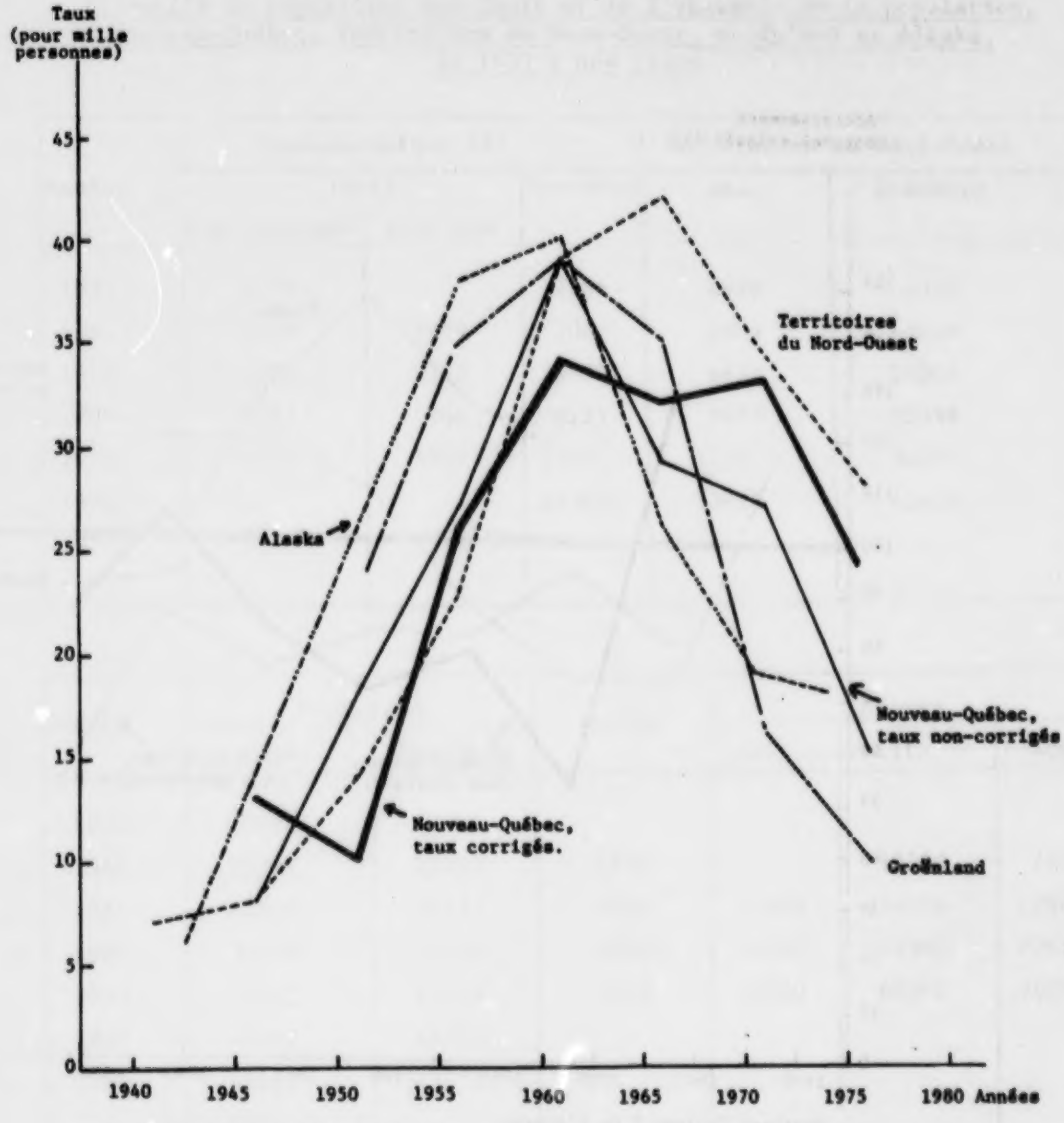
La fécondité semble jouer un rôle beaucoup plus important que la mortalité dans l'accroissement naturel des Inuit, si on se fie à la correspondance entre les courbes des figures 2 et 8.

En rapportant le taux d'accroissement naturel des Inuit à celui de l'ensemble de la population, on peut voir instantanément le rôle joué par l'accroissement naturel dans la diminution du poids démographique des Inuit. On remarque ainsi sur la figure 9 qu'au Nouveau-Québec, l'accroissement naturel des Inuit a été inférieur à celui de l'ensemble de la population. A l'opposé, pour les Territoires du Nord-Ouest après 1960, et l'Alaska durant l'ensemble de la période, l'accroissement naturel des Inuit a été supérieur à la moyenne. Pour le Groënland, les Inuit possèdent un taux légèrement au-dessus de la moyenne, jusqu'au milieu des années 1960, pour devenir inférieur par la suite.

Conclusion

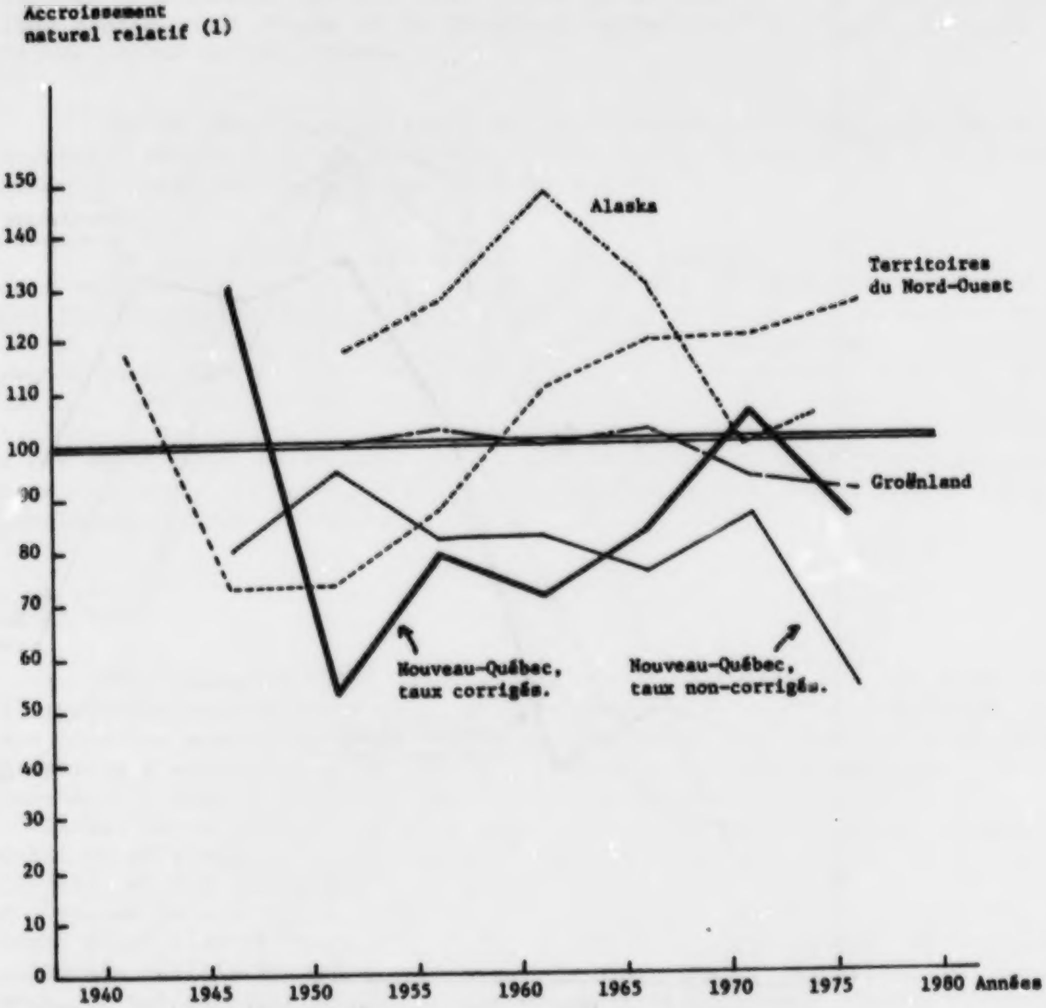
Si l'accroissement naturel peut expliquer, en partie, la chute de l'importance relative des Inuit au Nouveau-Québec, ce n'est certes pas le cas pour les autres régions. La population inuit voit donc son poids démographique s'affaiblir suite à un accroissement migratoire des effectifs non-inuit. Pour le Nouveau-Québec, les Territoires du Nord-Ouest et l'Alaska, cette tendance devrait s'accroître lors des prochaines années, suite au développement de l'exploitation des richesses naturelles de ces régions, et à l'implantation d'une main-d'oeuvre non-inuit. Le Groënland, à l'opposé de ces régions, devrait voir la proportion d'Inuit augmenter, étant donné l'adoption du *Home Rule*, en mai 1979, garantissant une certaine autonomie administrative et politique de cette région par rapport au Danemark, ce qui pourrait avoir pour conséquence de diminuer l'apport migratoire des Danois.

Figure 8. Taux d'accroissement naturel des Inuit du Nouveau-Québec, des Territoires du Nord-Ouest, du Groënland et de l'Alaska, 1940 à nos jours.



Sources: Tableau F de l'Annexe.

Figure 9. Accroissement naturel relatif[1] des Inuit par rapport à l'ensemble de la population, Nouveau-Québec, Territoires du Nord-Ouest, Groënland et Alaska, 1940 à nos jours.



Sources: Tableau F de l'Annexe.

Note (1): Taux d'accroissement naturel relatif = $\frac{\text{Taux d'accroissement naturel de la population inuit}}{\text{Taux d'accroissement naturel de l'ensemble de la population}} \times 100$

ANNEXE A

Tableau A

Effectifs de population des Inuit et de l'ensemble de la population, Nouveau-Québec, Territoires du Nord-Ouest, Groënland et Alaska, de 1930 à nos jours.

Années	Nouveau-Québec (1)			Territoires du Nord-Ouest	
	Inuit		Ensemble	Inuit	Ensemble
	non-corrigés	corrigés			
1931	1159		2584	4670	9316
1941	1778	1959	3067	5404	12028
1951	1989	2165	4470	6822	16004
1961	2467	2768	8121	7977	22998
1971	3755	3915	10002	11400	34805
1976			15369	13922	42610
1977	4532	4626			

Années	Groënland		Années	Alaska		
	Inuit	Ensemble		Inuit	Natifs (2)	Ensemble
1930	16488	16901				
1945	20939	21412	1940		32500	72524
1951	22890	24159	1950	16000	34000	128643
1960	30378	33140	1960	22300	42500	226167
1970	38912	46532	1970	28000	66382	300382
1977	40601	49719				
1980	40947	49773				

Sources: Voir les sources statistiques à la fin du texte.

Notes: (1) De 1931 à 1971, sub-division de recensement du Nouveau-Québec. A partir de 1976, région socio-sanitaire du Nouveau-Québec.

(2) Inuit, Indiens et Aleouts.

Tableau B

Taux bruts de natalité des Inuit et de l'ensemble de la population, Nouveau-Québec, Territoires du Nord-Ouest, Groënland et Alaska, 1940 à nos jours (taux pour 1000 personnes).

Périodes	Nouveau-Québec			Territoires du Nord-Ouest	
	Taux			Taux	
	non-corrigés	corrigés	Ensemble	Inuit	Ensemble
1939-1943	22	31	25	33	26
1944-1948	39 (1)	43	43 (1)	43 (1)	39 (1)
1949-1953	47	47	44	44	40
1954-1958	47 (1)	47	45	49 (1)	41
1959-1963	54	52	57	61	48
1964-1968	39 (1)	47	45	53	43
1969-1973	33	45	37 (3)	45	36
1974-1978	19 (1)	41 (2)	32 (4)	35	27

Périodes	Groënland		Périodes	Alaska	
	Taux			Taux	
	Inuit	Ensemble		Natifs	Ensemble
1941-1945		40	1943	30	
1946-1949		41 (1)			
1950-1953	45	44	1950-1953	45	31
1954-1958	48	47	1954-1958	48 (1)	35
1959-1963	49	48	1959-1963	49	32
1964-1968	44	42	1964-1968	35 (1)	25
1969-1973	23	23	1969-1972	25	24
1974-1978	18	18	1973-1975	24	21

Sources: Voir les sources statistiques à la fin du texte.

Notes: (1) Estimation de la population selon une interpolation linéaire des effectifs aux recensements.
(2) Période du 1/1/1974 au 30/6/1977. (3) Période 1969-1972.
(4) Période 1973-1975.

Tableau C

Taux globaux de fécondité générale des Inuit et de l'ensemble de la population, Nouveau-Québec, Territoires du Nord-Ouest, Groënland et Alaska, 1940 à nos jours (taux pour 1000 femmes de 15-49 ans).

Périodes	Nouveau-Québec			Territoires du Nord-Ouest	
	Taux			Taux	
	Inuit		Ensemble	Inuit	Ensemble
	non-corrigés	corrigés			
1939-1943	88	124		140	120
1944-1948	149(1)	170		190(1)	180(1)
1949-1953	171	171	211	194	190
1954-1958	187(1)	194	224	221(1)	203
1959-1963	234	223	251	281	230
1964-1968	177(1)	220	198	273(1)	206
1969-1973	145	206		222	158
1974-1978	85	188(2)	132(3)	157	111

Périodes	Groënland		Périodes	Alaska	
	Taux			Taux	
	Inuit	Ensemble		Natifs(5)	Ensemble
			1950-1953	214	163
			1954-1958	237	159(1)
1960	223		1959-1963	250	147
1970	124		1964-1968	199	107(1)
1972-1973	89		1969-1973	150	100
1978-1979	72	71(4)	1974-1978	140	87(6)

Sources: Voir les sources statistiques à la fin du texte.

Notes: (1) Estimation de la population féminine de 15-49 ans selon une interpolation linéaire des effectifs des générations aux recensements.
(2) Période du 1/1/1974 au 30/6/1977. (3) Période 1973-1974. (4) 1979.
(5) Taux calculés à partir de la population féminine de 15-44 ans.
(6) Estimation de la population féminine de 15-49 ans selon une interpolation linéaire des effectifs des générations au recensement de 1970.

Tableau D

Taux bruts de mortalité des Inuit et de l'ensemble de la population, Nouveau-Québec, Territoires du Nord-Ouest, Groënland et Alaska, 1940 à nos jours (taux pour 1000 personnes).

Périodes	Nouveau-Québec			Territoires du Nord-Ouest	
	Taux			Taux	
	Inuit		Ensemble	Inuit	Ensemble
	non-corrigés	corrigés			
1939-1943			25	26	20
1944-1948	31 (1)	30	34 (1)	35 (1)	28 (1)
1949-1953	29	37	25	30	35
1954-1958	20 (1)	22	12	26 (1)	15
1959-1963	15	18	10	22	13
1964-1968	10 (1)	15	7	11	8
1969-1973	6	12	6 (3)	10 (3)	7
1974-1978	4 (1)	17 (2)	4 (4)	6 (5)	5

Périodes	Groënland		Périodes	Alaska	
	Taux			Taux	
	Inuit	Ensemble		Natifs	Ensemble
1941-1945		20	1943	24	
1946-1949		26 (1)			
1950-1953	21	20	1950-1953	18 (6)	8
1954-1958	13	13	1954-1958	10 (7)	5
1959-1963	9	9	1959-1963	9 (8)	5
1964-1968	9	8	1964-1968	9 (9)	5
1969-1973	7	6	1969-1972	6 (10)	5
1974-1978	8	7	1973-1975	6 (11,12)	4

Sources: Voir les sources statistiques à la fin du texte.

Notes: (1),(2),(3),(4): Voir notes du tableau 2.
(5): 1976. (6): 1951. (7): 1955. (8): 1960.
(9): Période 1965-1966. (10): Période 1968-1969.
(11): Période 1974-1975.
(12): Estimation de la population selon une extrapolation linéaire des effectifs au recensement de 1970.

Tableau E

Taux de mortalité infantile des Inuit et de l'ensemble de la population, Nouveau-Québec, Territoires du Nord-Ouest, Groënland et Alaska, 1940 à nos jours (taux pour 1000 naissances).

Périodes	Nouveau-Québec				Territoires du Nord-Ouest	
	Taux				Taux	
	Inuit			Ensemble	Inuit	Ensemble
	non-corrigés	corrigés (1)	Légaré (1981) (2)			
1939-1943				214	168	154
1944-1948	196	197	308	235	191	162
1949-1953	185	258	312	197	169	125
1954-1958	218	227	267	129	220	137
1959-1963	145	180	206	71	196	121
1964-1968	93	153	133	54	94	67
1969-1973	68	83	140	50 (3)	84	52
1974-1978	73	111		44 (4)	43	33

Périodes	Groënland		Périodes	Alaska	
	Taux (5)			Taux	
	Inuit	Ensemble		Inuit	Ensemble
			1943	180	
1946-1951		156	1950	95	52
1952-1955		93	1957-1958		38
1954-1958	93	79 (6)	1959-1963	96	41 (7)
1961-1965	74	70	1964-1967	89	32
1966-1970	59	53	1968-1971		20
1971-1975	39	44	1972-1975		18
1978-1979	42		1977-1979	24	

Sources: Voir les sources statistiques à la fin du texte.

Notes: (1): Périodes du 1/6/1941 au 31/5/1946, 1/6/1946 au 31/5/1951, 1/6/1951 au 31/5/1956, 1/6/1956 au 31/5/1961, 1/6/1961 au 31/5/1966, 1/6/1966 au 31/5/1971 et 1/6/1971 au 30/6/1977.
(2): Périodes 1945-1949, 1950-1954, 1955-1959, 1960-1964, 1965-1969,1970-1974.
(3): Période 1969-1972. (4) Période 1973-1975. (5) Moyenne des taux selon le sexe. (6) Période 1956-1960. (7) Période 1959-1960.

Tableau F

Taux d'accroissement naturel des Inuit et de l'ensemble de la population, Nouveau-Québec, Territoires du Nord-Ouest, Groënland et Alaska, 1940 à nos jours (taux pour 1000 personnes).

Périodes	Nouveau-Québec			Territoires du Nord-Ouest	
	Taux			Taux	
	Inuit		Ensemble	Inuit	Ensemble
	non-corrigés	corrigés			
1939-1943			0	7	6
1944-1948	8	13	10	8	11
1949-1953	18	10	19	14	19
1954-1958	27	26	33	23	26
1959-1963	39	34	47	39	35
1964-1968	29	32	38	42	35
1969-1973	27	33	31(2)	35(2)	29
1974-1978	15	24(1)	28(3)	28	22

Périodes	Groënland		Périodes	Alaska	
	Taux			Taux	
	Inuit	Ensemble		Inuit	Ensemble
1941-1945		20	1943	6	
1946-1949		15			
1950-1953	24	24	1950-1953	27	23
1954-1958	35	34	1954-1958	38	30
1959-1963	39	39	1959-1963	40	27
1964-1968	35	34	1964-1968	26	20
1969-1973	16	17	1969-1972	19	19
1974-1978	10	11	1973-1975	18	17

Sources: Tableaux 2 et 4.

Notes: (1),(2) et (3): Voir notes (2),(3) et (4) au tableau 2.

Sources statistiques **ANNEXE B**

Inuit du Nouveau-Québec

Taux non-corrigés : Naissances, décès totaux et décès infantiles: Actes d'état civil, REGISTRE DE LA POPULATION DES INUIT DU NOUVEAU-QUÉBEC, DÉPARTEMENT DE DÉMOGRAPHIE, UNIVERSITÉ DE MONTRÉAL.

Population totale et population féminine de 15-49 ans: Recensements du Canada, BUREAU FÉDÉRAL DE LA STATISTIQUE et STATISTIQUE CANADA; Liste de la Commission d'inscription, 1977, CONVENTION DE LA BAIE JAMES ET DU NORD QUÉBÉCOIS.

Taux corrigés et espérances de vie à la naissance : REGISTRE DE LA POPULATION DES INUIT DU NOUVEAU-QUÉBEC, DÉPARTEMENT DE DÉMOGRAPHIE, UNIVERSITÉ DE MONTRÉAL.

Taux de mortalité infantile calculés par Jacques Légaré : LÉGARÉ (1981), page 8.

Ensemble de la population du Nouveau-Québec

Naissances, décès totaux et décès infantiles, 1930 à 1972: Statistiques de l'état civil, BUREAU FÉDÉRAL DE LA STATISTIQUE et STATISTIQUE CANADA.

Population totale, 1931 à 1971: Recensements du Canada, BUREAU FÉDÉRAL DE LA STATISTIQUE et STATISTIQUE CANADA.

Population par âge, 1951 à 1966: Table de mortalité abrégée selon les régions administratives, 1950-52, 1955-57, 1960-62 et 1965-67, BUREAU DE LA STATISTIQUE DU QUÉBEC, Volume 9.

Décès par âge, 1950-52 à 1965-67: Les causes de décès au Québec suivant les groupes d'âges, régions administratives, BUREAU DE LA STATISTIQUE DU QUÉBEC, Volume 2.

Taux bruts de natalité, taux globaux de fécondité générale, taux bruts de mortalité, taux de mortalité infantile, période 1973-1975: Statistiques des Affaires Sociales, MINISTÈRE DES AFFAIRES SOCIALES DU QUÉBEC.

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Population Forecasting with Economic Simulation Models *

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I. INTRODUCTION

The material presented in this paper is a summary of a computer simulation model of the economy of the Northwest Territories.

The model is a demand-driven, non-linear specification built around the sector accounts of the Northwest Territories Economic Accounts and supplemented by numerous other federal government and GNWT data sources as well as first hand observations and advice from individuals experienced in the various sectors of the economy.

Given the parameter values estimated from the data sources mentioned above, values for the exogenous variables and initial values for the predetermined variables, the model generates values for all the endogenous economic and population variables for as many time periods as the user specifies. Maximum flexibility is ensured by having the values for the exogenous variables, predetermined variables and parameters read in as "data" to the model. This "data set" can be readily changed, without affecting the program, in order to conduct policy or sensitivity analyses or to utilize new information as it becomes available.

The formal structure of the model is presented in Section II of this paper. In Section III an "evaluation" of the model is shown by comparing "forecasts" made with it against historical experience. The use of the model for impact analysis, or scenario testing, is also illustrated in this section.

II. NORTHWEST TERRITORIES MODEL

Regional Income Determination

$$(1)\quad Y_{r_t} \equiv C_t + I_t + G_{L_t} + G_{T_t} + G_{F_t} + \sum_{i=1}^{4} X_{i_t} - M_{c_t} - M_{g_t} - \sum_{i=1}^{4} M_{X_{i_t}} - M_{k_t}.$$

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* Summarized from a model prepared for the Government of the Northwest Territories by J.C. Stabler and M.R. Olfert.

The gross territorial product accounting equation includes expenditures by three levels of government (local, territorial, and federal), four export industries, and imports disaggregated by sector.

(2) $C_t = bY^d_{r_{t-1}}$.

Consumption expenditure is a homogeneous function of disposable income in the previous time period.

(3) $Y^d_{r_t} \equiv Y^p_{r_t} - T_t$.

Disposable income is personal income less personal income taxes (paid only to the federal government).

(4) $Y^p_{r_t} \equiv Y_{r_t} - CC_t - NIT_{L_t} - NIT_{T_t} - NIT_{F_t} - RE_t + W_{L_t} + W_{T_t} + W_{F_t}$.

Personal income is regional income *less* capital consumption (CC), retained earnings (RE), net indirect taxes (indirect taxes less subsidies) paid to all three levels of government (NIT). Added to the resultant to arrive at personal income are transfer payments to persons (W) from each level of government.

(5) $CC_t = sK_t$

Some proportion of the capital stock depreciates annually.

(6) $K_t \equiv K_{t-1} + I_{t-1} - CC_{t-1}$.

The size of the capital stock is determined by the capital stock in the previous time period, plus investment expenditures, less capital consumption.

(7) $IT_{L_t} = x_1Y_{r_t}$.

(8) $IT_{T_t} = x_2Y_{r_t}$.

(9) $IT_{F_t} = x_3Y_{r_t}$.

Indirect taxes to each level of government are related to gross territorial product by tax 'rates'.

(10) $RE_t = RE_t^*$.

Earnings not paid out to persons (including unremitted profits of government enterprises, corporate retained earnings, and government investment income) are exogenous.

(11) $T_t = aY^P_{r_t}$.

Personal income taxes to the federal government are a function of personal income.

(12) $W_{L_t} = dR_{L_t}$.

(13) $W_{T_t} = \pi R_{T_t}$.

(14) $W_{F_t} = \sigma R_{F_t}$.

Transfers to persons are some fraction of total transfers by each level of government to non-government (i.e. persons + business).

(15) $R_{L_t} \equiv OR_{L_t} + TR^L_{T_t} + TR^L_{F_t} - G_{L_t}$.

Transfers to non-government sectors from the local government are the residual of total receipts less government expenditures, i.e. they are subject to a budget constraint. Total receipts of the local government include revenue from own sources (OR) and net transfers (TR) from the territorial and federal governments.

(16) $OR_{L_t} \equiv IT_{L_t} + OOR_{L_t}$.

Own revenues of the local government are composed of indirect tax revenues and 'other' own revenues.

(17) $OOR_{L_t} = y_1 Y_{r_t}$.

Other own revenues of the local government (taxes, licences, fines, fees, sale of goods and services) are a function of gross territorial product.

(18) $TR^{L}_{F_t} = f_1(P_t)$.

(19) $TR^{L}_{T_t} = f_2(P_t)$.

Net transfers from the territorial and federal governments to the local government are both functions of population size.

(20) $G_{L_t} = G^{*}_{L_t}$.

Local government current expenditures are exogenous.

(21) $R_{T_t} \equiv OR_{T_t} + TR^{T}_{F_t} - G_{T_t} - TR^{L}_{T_t}$.

Transfers to the non-government sector from the territorial government are the residual of total receipts less expenditures, i.e. they are subject to the budget constraint. Total receipts of the territorial government include revenue from own sources (OR) and net transfers (TR) from the federal government.

(22) $OR_{T_t} \equiv IT_{T_t} + OOR_{T_t}$.

Own revenues of the territorial government are composed of indirect tax revenues and 'other' own revenues.

(23) $OOR_{T_t} = y_2 Y_{r_t}$.

Own revenues of the territorial government (taxes, licences, fines, fees, sale of goods and services) are a function of gross territorial product.

(24) $TR^{T}_{F_t} = f_3(P_t)$.

Net transfers from the federal to the territorial government are a function of population size.

$$(25) \quad G_{T_t} = G^{*}_{T_t}.$$

Territorial government current expenditures are exogenous.

$$(26) \quad R_{F_t} = D_t + g(\bar{Y}^{E}_{n_{t-1}} - \bar{Y}^{E}_{r_{t-1}}) \cdot P_{t-1} + UI_{t-1}.$$

Transfers from the federal government to the non-government sectors (persons and business) have a component which is independent of economic conditions in the region (D), a component that depends on regional per capita earned income disparities, and a component determined by the amount of unemployment in the region.

$$(27) \quad D_t = D^{*}_t.$$

The autonomous part of federal government transfers includes pensions, allowances, etc.

$$(28) \quad \bar{Y}^{E}_{n_t} = \bar{Y}^{E*}_{n_t}.$$

National per capita earned income is exogenous.

$$(29) \quad \bar{Y}^{E}_{r_t} \equiv \left[Y^{P}_{r_t} - (W_{L_t} + W_{T_t} + W_{F_t})\right] / P_t.$$

Earned income is simply personal income less transfers, divided by population size.

$$(30) \quad UI_t = \eta U_t.$$

The part of transfer payments that are unemployment insurance payments are the product of an 'average' payment per unemployed person and the number unemployed in the region.

$$(31) \quad I_t = A_t + k(X_{3_{t-1}} - X_{3_{t-2}}) + V_{L_t} + V_{T_t} + V_{F_t}.$$

(32) $A_t = A_t^*$.

(33) $V_{L_t} = (1-d)R_{L_t}$.

(34) $V_{T_t} = (1-\pi)R_{T_t}$.

(35) $V_{F_t} = (1-\sigma)R_{F_t}$.

Investment expenditures have an autonomous component (A), an induced component, and a part that is the direct result of transfers (V) from each level of government to business. These transfers are the residual of total transfers to the non-government sector less the fraction that is paid to persons.

(36) $G_{F_t} = G_{F_t}^*$.

Federal government current expenditures are exogenous.

(37) $X_{i_t} = X_{i_t}^*$.   for $i=1$ to 4.

Gross value of exports in four other export sectors (mining, trapping, tourism, and oil and gas exploration) are exogenous.

(38) $M_{c_t} = c_t C_t$.

(39) $M_{k_t} = m_t I_t$.

(40) $M_{g_t} = \gamma_t G_{L_t} + G_{T_t} + G_{F_t})$.

(41) $M_{X_{i_t}} = \lambda_{i_t} X_{i_t}$,   for $i = 1$ to 4.

Some portion of total expenditures by each of the sectors (consumers, investors, government, and the four export industries) is for imports.

(42) $c_t = \beta_1 + \beta_2/(Z_t + \beta_3)$.

(43) $m_t = \alpha_1 + \alpha_2/(Z_t + \alpha_3)$.

(44) $\gamma_t = \delta_1 + \delta_2/(Z_t + \delta_3)$.

(45) $\lambda_{i_t} = \mu_{i_1} + \mu_{i_2}/(Z_t + \mu_{i_3})$.

(46) $Z_t = W_1 Y_{r_{t-1}} + W_2 Y_{r_{t-2}} + W_3 Y_{r_{t-3}}. \quad \sum_{i=1}^{3} W_i = 1.0.$

The portion of total expenditures by each sector that is imported (marginal propensity to import) varies, within certain constraints, with weighted past income (Z). Essentially the marginal propensity to import has a lower bound which may be defined as the imports of non-competitive goods. Starting from a high, initial value, the MPM declines continuously in a lagged fashion as regional income increases, up to the pre-defined lower limit. This process of diminishing MPM's allows for import substitution to take place as demand thresholds are crossed in the region.

Population and Employment Determination

(47) $E_t \equiv \sum_{i=1}^{4} E_{X_{i_t}} + E_{G_t} + E_{R_t}$.

Total employment in the region is the sum of employment in the export industries, employment of all levels of government and employment in the residentiary sector.

(48) $E_{X_{i_t}} = \rho X^*_{i_t}(X_{i_t} - M_{X_{i_t}})$, for i = 1 to 4.

(49) $E_{G_t} = \rho G^*_t (G_{L_t} + G_{T_t} + G_{F_t} - M_{G_t})$.

(50) $E_{R_t} = \rho_{R^*_t}(Y_{r_t} - (\sum_{i=1}^{4} X_{i_t} - \sum_{i=1}^{4} M_{X_{i_t}}) - (G_{L_t} + G_{T_t} + G_{F_t} - M_{g_t}))$

Employment in each sector is determined by the labour/value-added ratio (exogenous) and local value-added in that sector. Residentiary employment is derived as a residual, i.e. it is determined by value of local production net of local value-added in the export and government sectors.

(51) $P_t = \sum_{i=1}^{15} NP_{i_t} + \sum_{i=1}^{15} NNP_{i_t}$.

Total population is the sum of native population and non-native population by age group. Non-native population is defined as population other than Indian and Eskimo.

(52) $NP_{i_t} = NP_{i_t}^*$, for i = 1, 15.

Native population is determined exogenously. Population projections are based on age- and sex-specific death and birth rates.

(53) $NNP_t = NNP_{t-1} + f \cdot IM_t$.

Non-native population size is endogenously determined; in any time period, non-native population is the sum of non-native population in the previous time period plus the in- (or out-)migrant labour force and their families.

(54) $IM_t \equiv \sum_{i=1}^{6} IM_{i_t}$, for i = 1 to 6.

In-migrant workers are the sum of in-migrants in each of 6 sectors, i.e. the four export sectors, government, and residentiary as determined by the activity level projected by sector.

(55) $IM_{i_t} = o_i(E_{i_t} - E_{i_{t-1}})$ for i = 1 to 6.

The number of in-migrant workers in each sector are determined by the change in employment in that sector and the proportion of the employees in that industry which, in the past, have been non-native.

(56) $U_t \equiv NALF_t + NNALF_t - E_t$.

Unemployment is the residual of the active labour force and total employment.

(57) $NALF_t = pNPLF_t$.

The native active labour force is related to the potential labour force by the participation rate.

(58) $NNALF_t = qNNPLF_t$.

The non-native active labour force is the proportion of the potential labour force that participates in the labour market.

(59) $NPLF_t \equiv \sum_{i=4}^{13} NP_{i_t}$.

The native potential labour force is the sum of the population ages 15-64.

(60) $NNPLF_t = rNNP_t$.

The non-native potential labour force is some constant proportion of the non-native population.

III. USES AND INTERPRETATION

The model was constructed as both a medium term forecasting model and an analytic tool. Forecasts are generated for as many time periods as the user specifies (subject to size constraints of the computer). To the extent that the model 'tracks' well over the estimation period, short- to medium-term forecasts may be considered realistic in the absence of major structural change. As an analytic tool, impact analyses or scenario tests can be conducted. Evaluation of the analytic capabilities of the model relies on comparisons with other empirical studies, with conventional wisdom, with expectations of experts, and intuition.

1. Forecasting Ability

A first test of the model is whether or not it can duplicate the past for the estimation period. That is, based on projected (actual) values for the exogenous variables, initial values of the endogenous variables and parameters, the model will generate its own values for the endogenous variables for each succeeding time period. The simulated values can then be compared with actual data to determine how well the model 'tracks'.

The forecasting performance of the model for the estimation period is illustrated for selected variables in the accompanying graphs. Figures 1 through 8 show, for selected variables, actual values and values generated by the model (simulated). In general, the model tracks well for the more aggregate measures of economic activity -- Gross Territorial Product, Personal Income, Consumption, and Population. Of these, Consumption, Personal Income, and GTP tend to be somewhat understated for the first years of the estimation period and somewhat overstated for the remainder.

Investment expenditures are more volatile and are thus more difficult to track. This is a reflection of the behaviour of 'autonomous' investment (a large component of total investment) over the estimation period.

The departures of simulated total population from actual population is due to errors in the estimation of net-immigration. On the whole the errors are very small. The population at the beginning of the estimation period is taken as given. Rates of natural increase for the 'immobile' population (defined as all Indians and Eskimos) are used to project this portion of the population to be consistent with actual observations. The other population is augmented or depleted in response to *changes* in the number of 'jobs' in the Northwest Territories. This endogenous part of population growth will thus be a reflection on the model's behaviour in projecting GTP and its components.

Imports tend to be understated for most of the estimation period. Since total imports are an aggregation over six sectors it is difficult to determine the source of discrepancy. In general, the marginal propensities to import were lower in the earlier periods. Using an average marginal propensity to import over the entire estimation period explains part of the observed errors. Exports, as well, are understated for most of the estimation period. While exports are exogenous, applying average annual growth rates leads to errors for some years. Further, total exports are a composite of four export sectors so small errors in each variable all in the same year are compounded.

'Forecasts' of the model, that is simulations beyond the time for which data is available, must be evaluated in terms of both the tracking performance of the model and the validity of the projected values of the exogenous variables.

Figure 1

Gross Territorial Product
Actual vs. Simulated

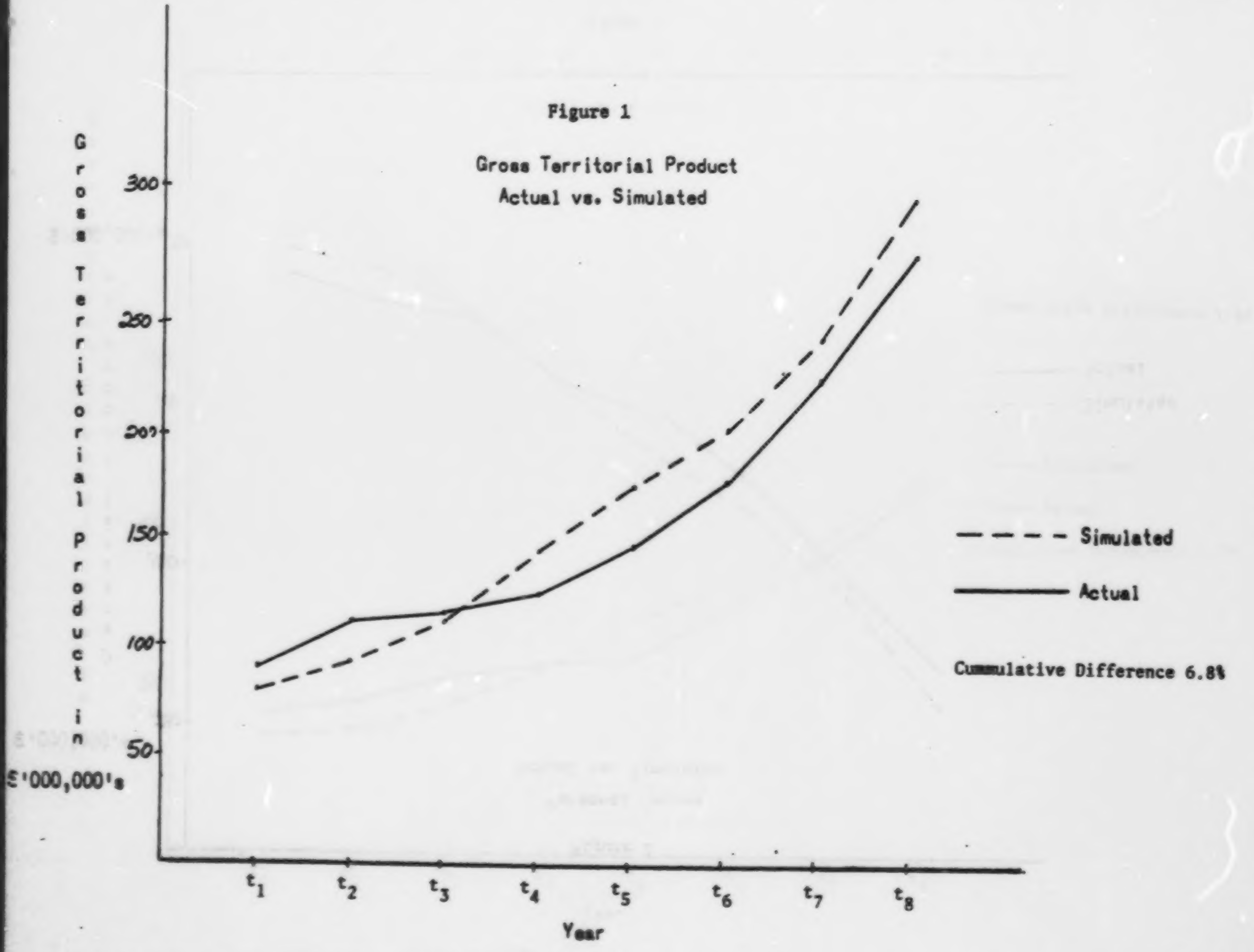


Figure 2

Personal Income
Actual vs. Simulated

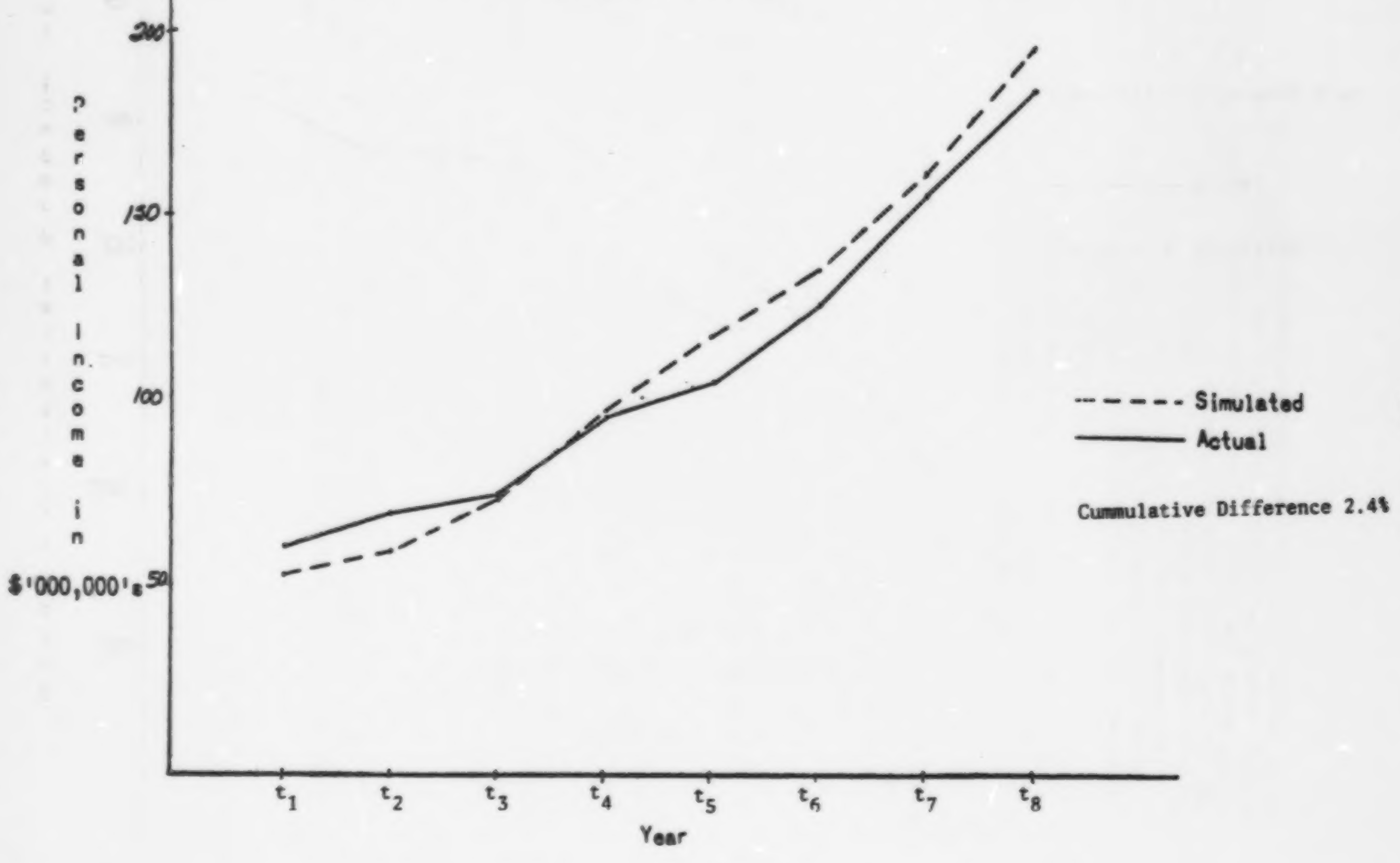


Figure 3

Consumption Expenditures
Actual vs. Simulated

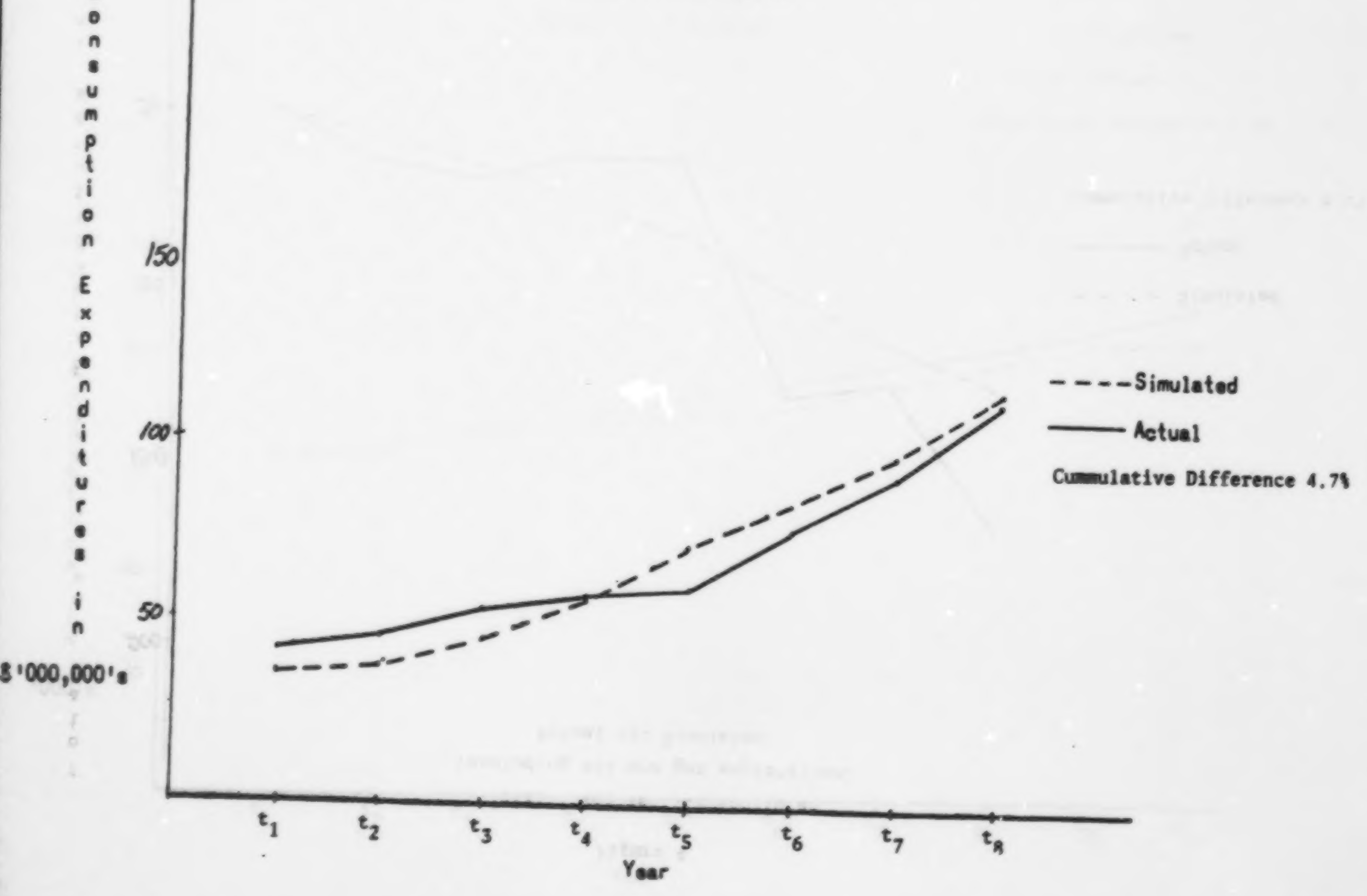


Figure 4

Total Investment Expenditures
(excluding oil and gas exploration)
Actual vs. Simulated

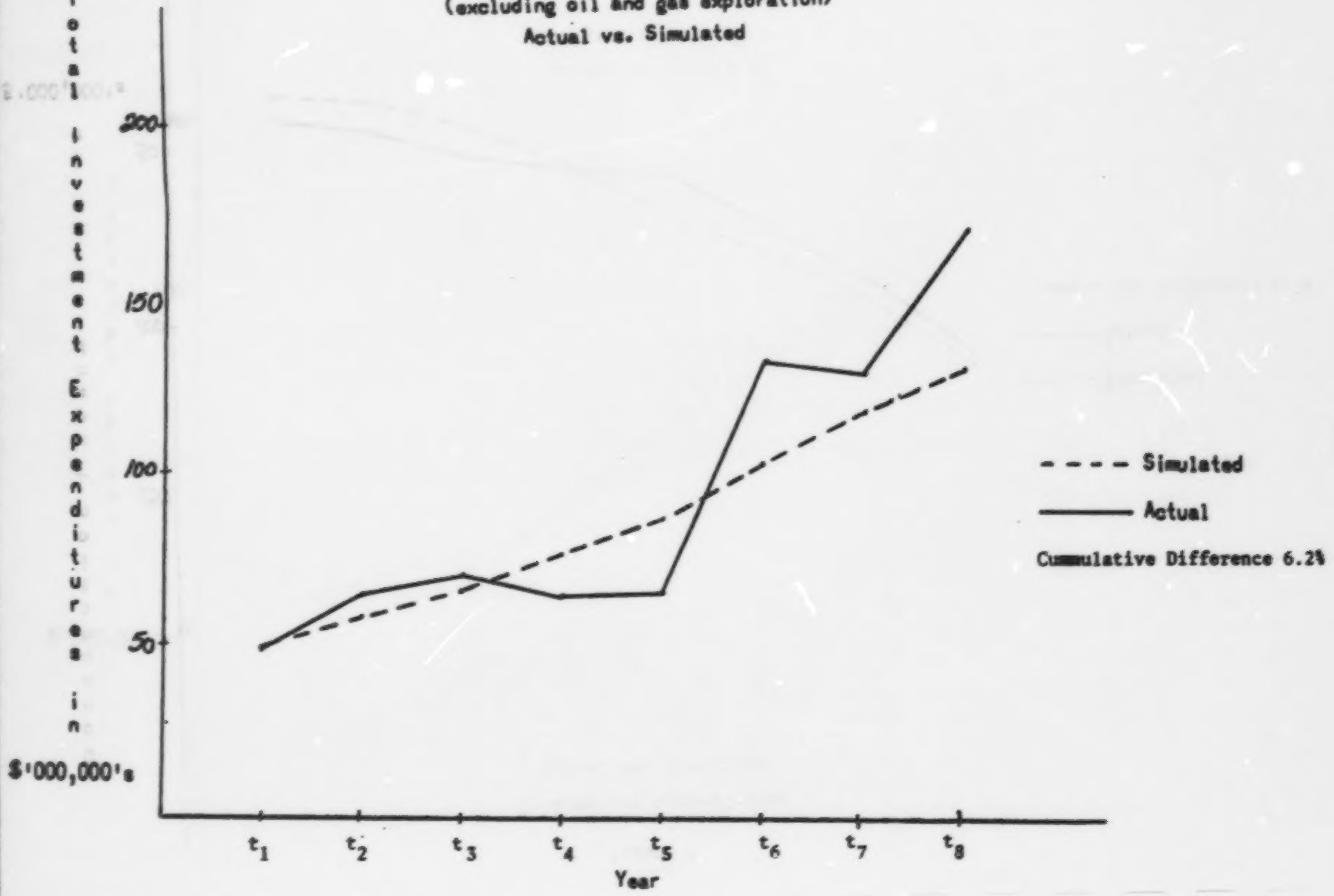


Figure 5

Total Population
Actual vs. Simulated

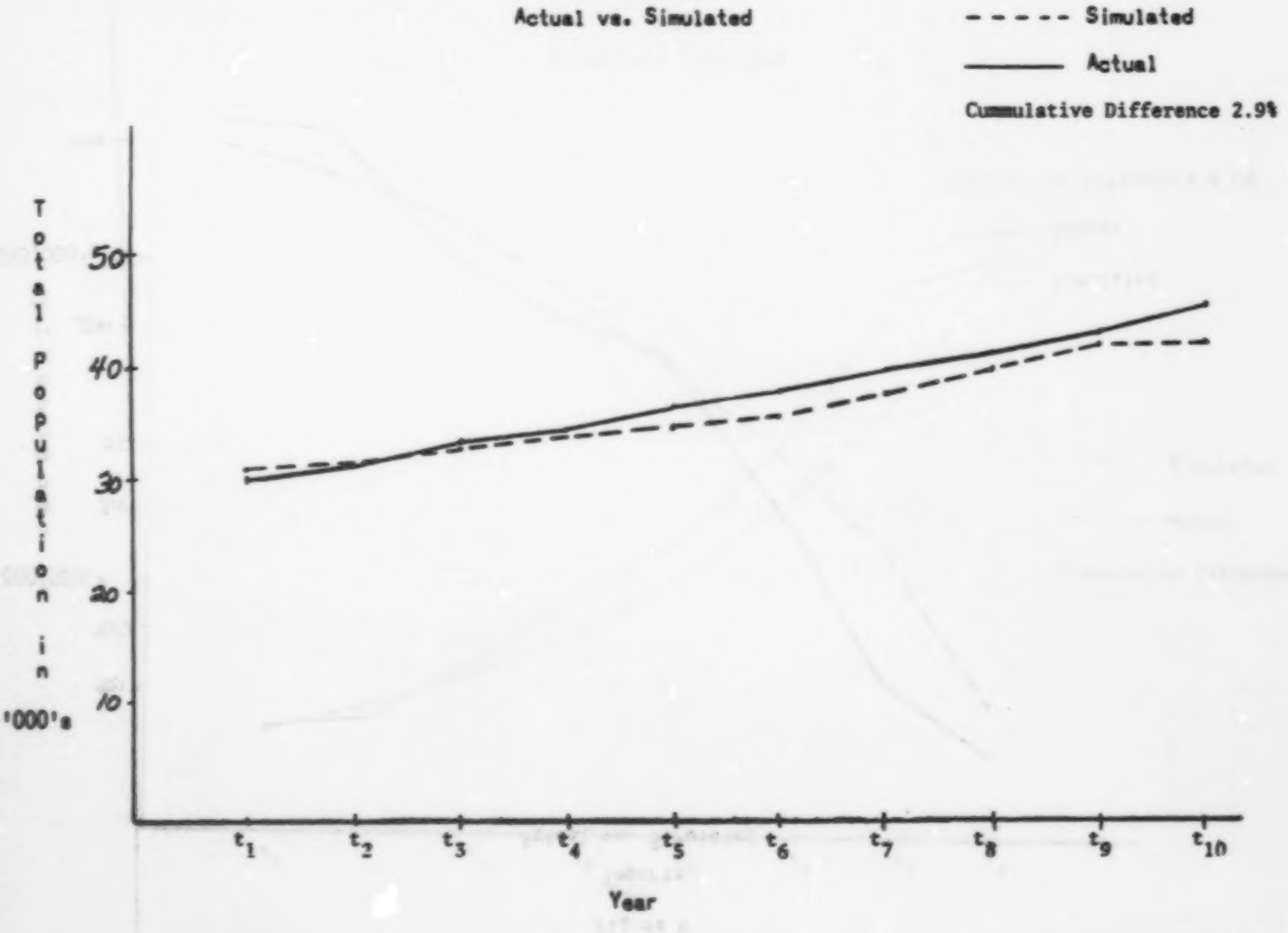


Figure 6

Imports

Actual vs. Simulated

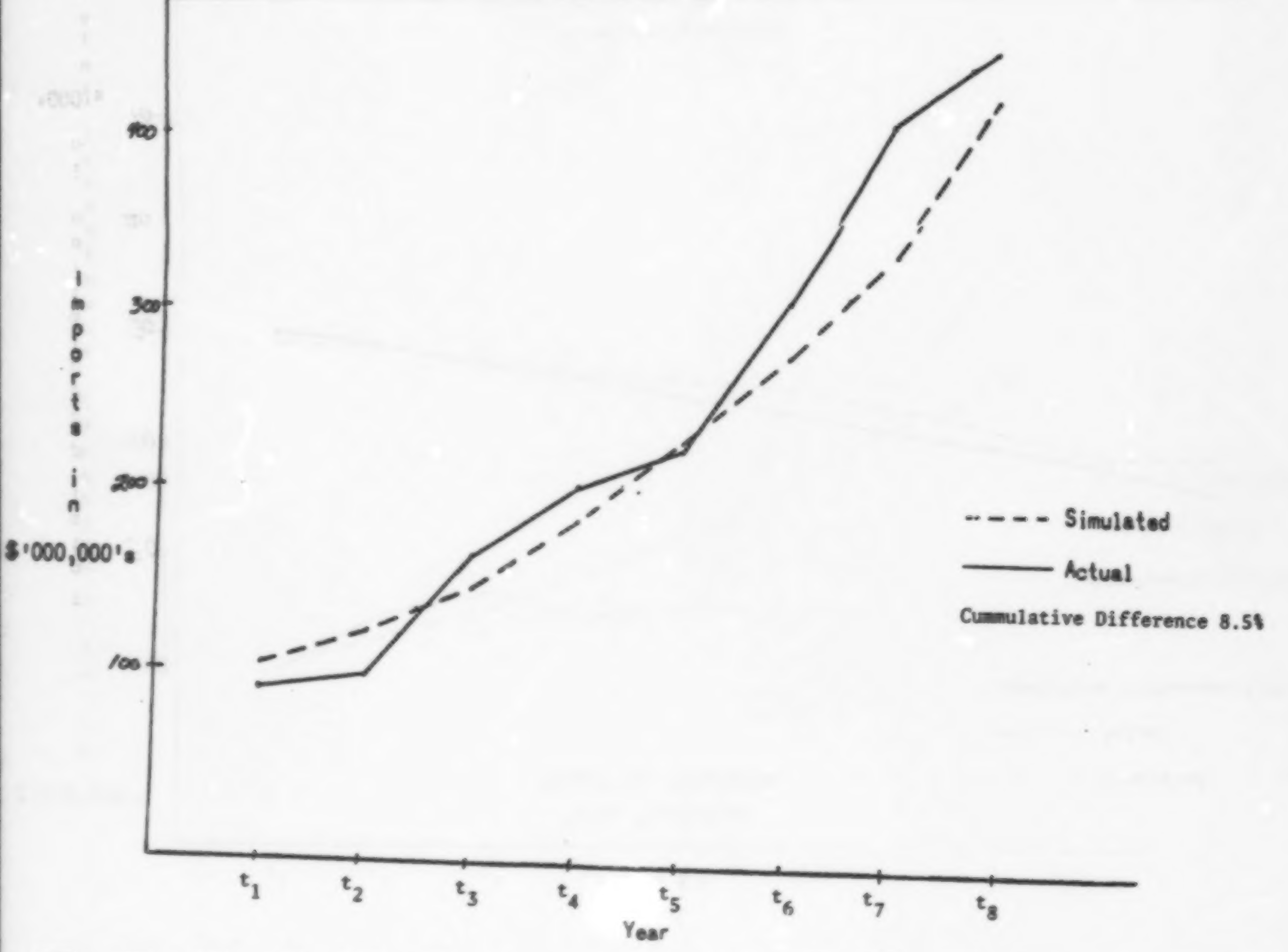


Figure 7

Exports
Actual vs. Simulated

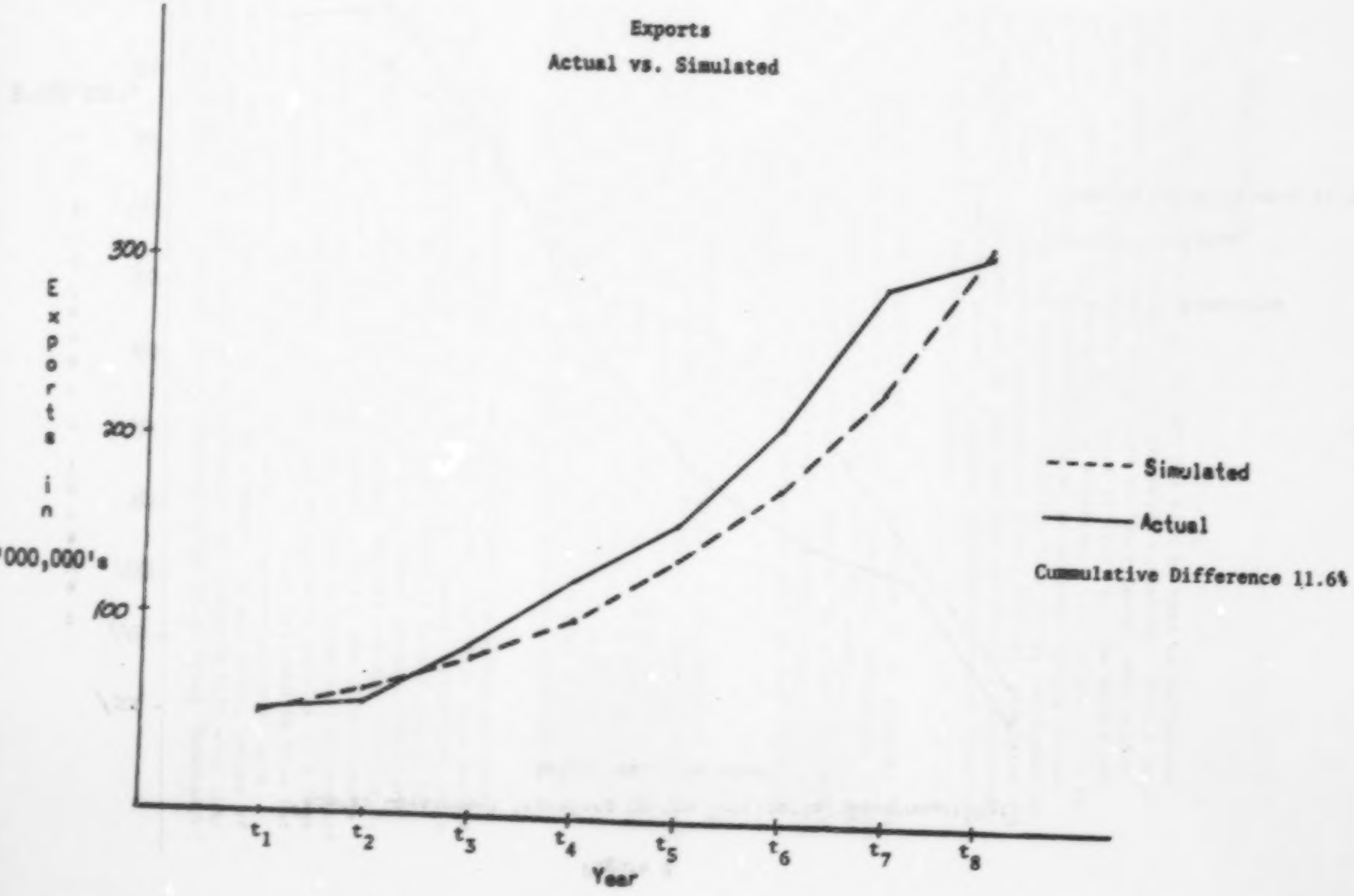
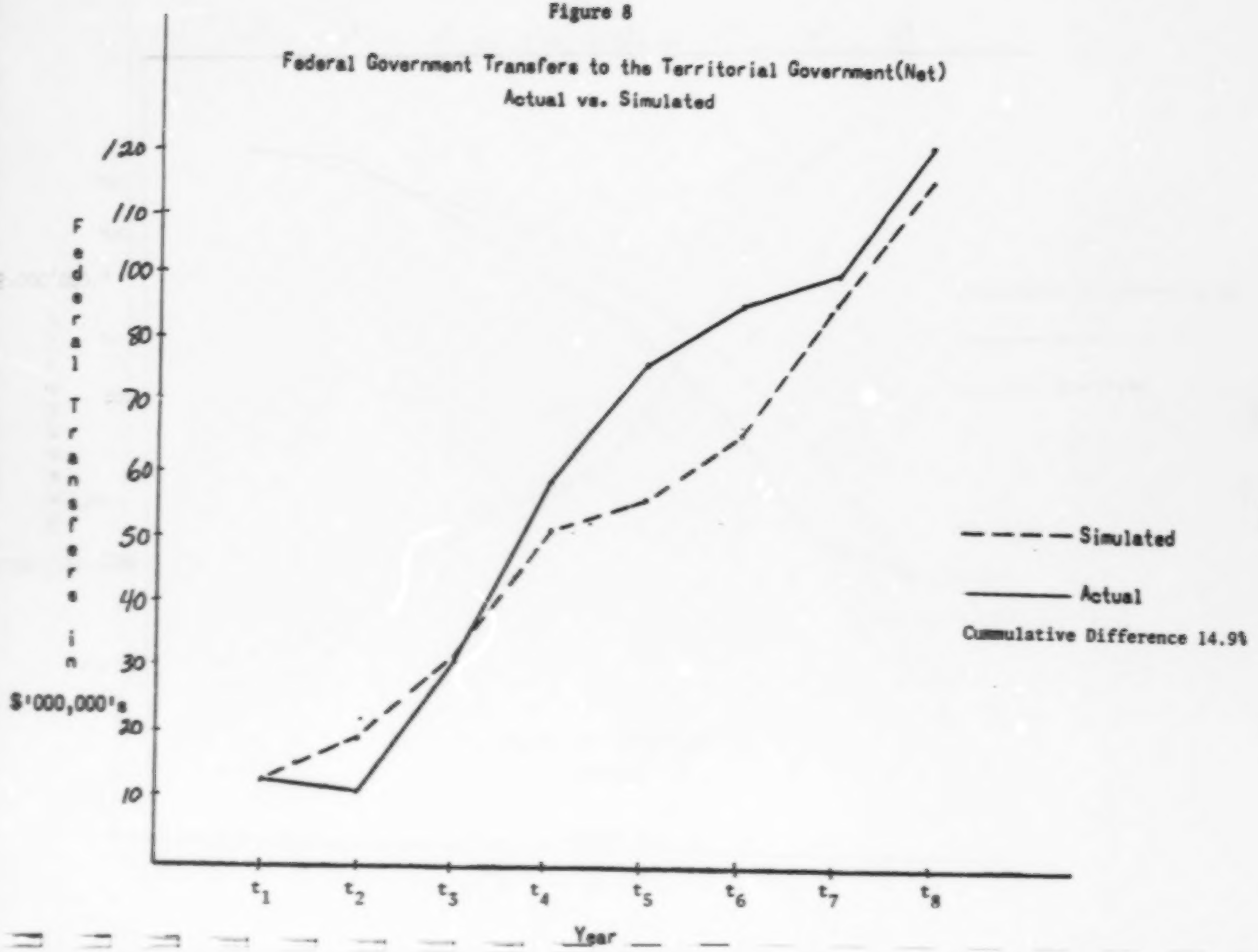


Figure 8

Federal Government Transfers to the Territorial Government(Net)
Actual vs. Simulated



II. IMPACT ANALYSIS

The simulation model of the NWT can also be used to define and quantify the impact of changes in the exogenous variables. From a management perspective, the model can be used to 'experiment' with policy changes. For any policy change at a point in time, all the direct and indirect ramifications in the economy in subsequent time periods will be generated by the model. The complexities of an economic system include numerous feedback loops and inter-relationships that may be overlooked by intuitive logic. A quantified, computerized model, however, simulates all the impacts at a high speed and low cost and does so within a consistent framework. Such analyses assume, of course, that the structural relationships represented in the model are correct.

Given a correct specification of the structure of the economy, the model's usefulness as an analytic tool may be relatively independent of the accuracy of the absolute values of the variables. For example, an employment multiplier of 1.5 is useful information even if the actual employment in a particular year is over- or understated. Further, a comparison of the impact of alternative strategies relies perhaps as much on their *relative* merits as on their absolute impacts.

Specific aspects of the impact of a change in the exogenous variables may be summarized by measures such as income and employment multipliers. These multipliers show the magnitude of the effect on a particular variable relative to the initiated change. In this way the various multipliers may be considered measures of the *effectiveness* of policies in achieving their objectives. Alternatively, if the desired objective is specified (for example, zero unemployment), various ways of achieving that objective and the associated costs can be determined by trial and error experiments.

By way of demonstrating the use of the model for impact analyses, four typical types of analysis are described below. The first is a measure of the income multiplier effect of a change in government expenditure and a change in exports of the mining sector. The effects of both a change in 'gross' expenditures and a change in local value-added (gross expenditure less imports) are examined. Second, employment multipliers are calculated, again for the government and the mining sectors. Third, the effectiveness of a change in expenditures in the same two sectors in terms of jobs created per dollar spent is simulated. Finally, the more general results of a loss of mining employment, such as the closure of the Giant Yellowknife Mine for example, are presented to illustrate the model's representation of both indirect and direct effects on the entire economy. In all cases, values of target variables in the simulated 'experiments' are compared with what they would have been in the absence of the imposed change (i.e. using "benchmark" values).

a) Impact multipliers

Two economic indicators that are conventionally used as summary measures of impacts are income and employment. Impacts on both income and employment will vary not only with the magnitude of a shock but also with the sector where the change occurs. The differential impacts are the result of different labour to value added ratios, different import leakages and different in-migration responses. A change in exogenous demand results first in a change in value-added in that sector, the magnitude of which depends on the import leakages. For a given change in value-added, the labour to value-added ratio (unique to each sector) determines the amount of employment that results. Employment changes together with in-migration parameter determine net migration into or out of the region. Finally, the indirect effects occur as the new income is spent and re-spent by the (larger) population.

i) Income Multipliers -- Changes in federal government spending and in the gross value of mineral exports are used to illustrate the determination of income multipliers. The hypothetical expenditure increases were introduced in 1974 and the final impact measured in 1980, to accommodate all the eventual indirect effects. The multiplier was then calculated as

$$K_1 = \frac{\text{1980 Experiment GTP — 1980 Benchmark GTP}}{\text{1974 Initiated Change in Gross Expenditure}}$$

The resulting multipliers were 0.53 for mining and 2.10 for government spending. This means that for every additional dollar sales of mineral products, GTP in the NWT will eventually be 53 cents higher than it otherwise would have been. An additional dollars increase in demand by the government sector in the NWT (not offset by taxes) will result in an eventual increase in GTP of $2.10. These increases in GTP include the additional expenditures in the mining and government sectors (net of imports) as well as all the indirect effects in other sectors. Import leakages are much larger for mining than for the government sector. Further, the labour to local value added ratio in the government sector is larger than in the mining industry, reflecting the relatively capital intensive production in the mining sector. These effects are apparently more than enough to offset the larger in-migration impact of a change in mineral exports. Although for a given change in employment, a greater number of the jobs are filled by in-migrants in mining than in the government sector, the gross expenditure required to generate a given number of jobs is much greater in the mining sector.

A second income multiplier which may be of interest is the multiplier associated with a change in local value-added rather than gross expenditures. This multiplier is a measure of the impact of a change in expendi-

tures *in the region* (net of imports). The multipliers for a change in local value-added in the government sector and the mining sector were 3.01 and 1.83 respectively. The relative impact of an expenditure increase in the government and mining sectors is the same as that of a gross expenditure increase. The larger impact of an increase in local value-added in the government sector may be attributed to the larger labour to value-added ratio in that sector. These multipliers were calculated as:

$$K_2 = \frac{\text{1980 Experiment GTP} - \text{1980 Benchmark GTP}}{\text{1974 Initiated Change in Local Value-Added}}$$

ii) Employment Multipliers — Aside from the actual expenditures involved, employment multipliers may offer a useful measure of the indirect effects of a change in employment in a particular sector. An employment multiplier is calculated as:

$$K_3 = \frac{\text{1980 Experiment Total Employment} - \text{1980 Benchmark Total Employment}}{\text{1974 Initiated Change in Employment}}$$

Again the multipliers were the result of introducing a change in gross expenditures in the government and mineral sectors in 1974. The multipliers were calculated to be 3.45 and 2.27 for the government and mining sectors respectively. This means that for each job generated in the government sector, for example, an additional 2.45 jobs are eventually generated in other sectors in the economy. For the mining sector the corresponding impact is an additional 1.27 jobs. The smaller multiplier for the mining sector suggests that fewer residentiary activities are induced by a change in mining than in government expenditures. This may be due to the observed transience of mining labour and a higher propensity to save compared with government employees who more frequently establish family residence and probably have a higher propensity to spend.

b) Job-Creation Efficiency

A policy change or a change in external demand may also be evaluated in terms of expenditures required per job created. Using information from the experiments discussed above, the cost per job can be calculated as:

$$\text{Cost} = \frac{\text{1974 Initiated Change in Gross Expenditures}}{\text{1980 Experiment Total Employment} - \text{1980 Benchmark Total Employment}}$$

This ratio will show the 1974 cost for every job created between 1974 and 1980 as a consequence of the initiated expenditure. The corresponding costs for government and mining were $13,402 and $69,949 respectively. The lower cost in the government sector is the consequence of lower import leakages and a higher labour to value added ratio.

c) System Impacts

The simulation of the effects of an exogenous change offers a great deal of information that is not necessarily represented by the summary measures suggested above. First, the impact multipliers show what the eventual impact was on a particular economic indicator, *at a point in time*. In some cases it may be of interest to examine the *cumulative* effects over a period of time or to observe how the effects are distributed through time. Second, all the indirect effects are not apparent from the size of the multiplier. A more complete indication of the impact on the entire economy is available by examining the impact on a larger number of variables. As an illustration of this, the Closure of the Giant Yellowknife Mine was simulated.[1] The impacts on selected variables are represented in the following graphs (Figures 9 through 12).

The impact on GPT appears rather small but the entire impact would probably be felt in Yellowknife and the immediate area. At the local level the impact would be relatively much greater than on the territorial economy. In the third year after the closure of the mine, most of the short-term fluctuations have dampened and the economy moves along growth paths similar to, but below, the benchmark paths. Unemployment rises substantially for a number of years due to the jobs lost but then, since in-migration turns negative, and therefore population decreases, the size of the labour force diminishes.

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1. The nature of this change was assumed to consist of a reduction in mineral exports sufficient to reduce the number of jobs in mining by 350.

Figure 9
Gross Territorial Product
Experiment vs. Benchmark

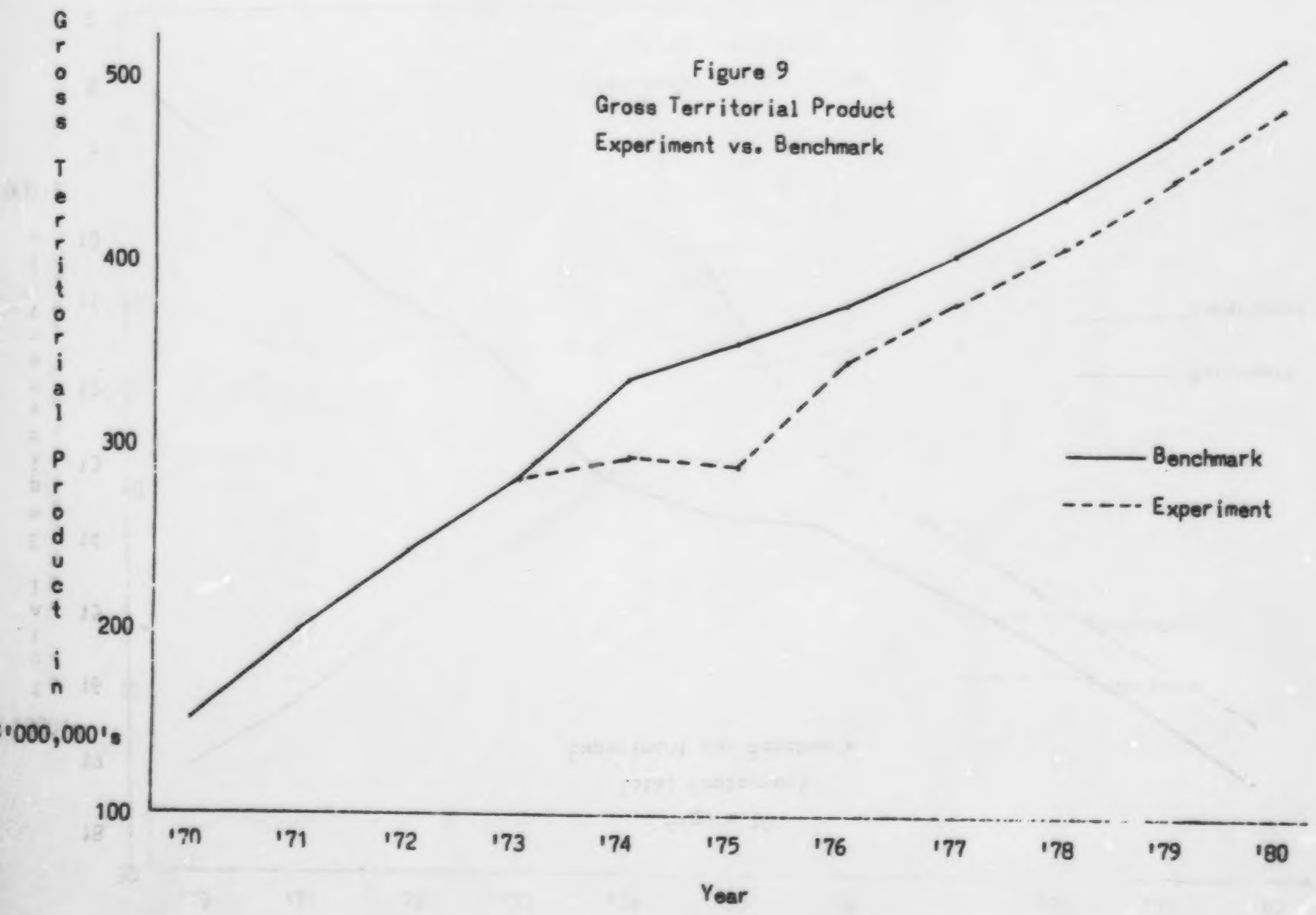
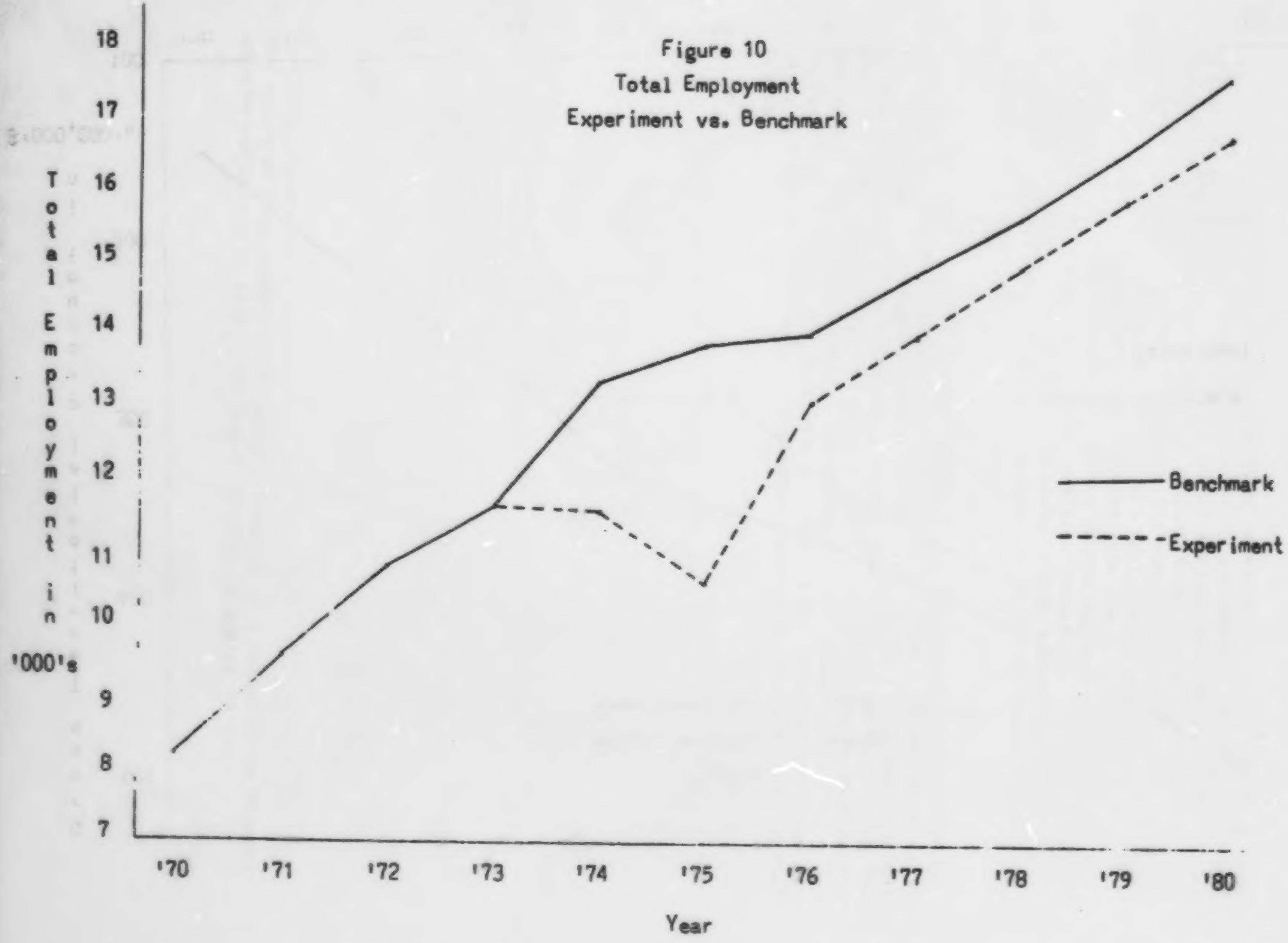


Figure 10
Total Employment
Experiment vs. Benchmark



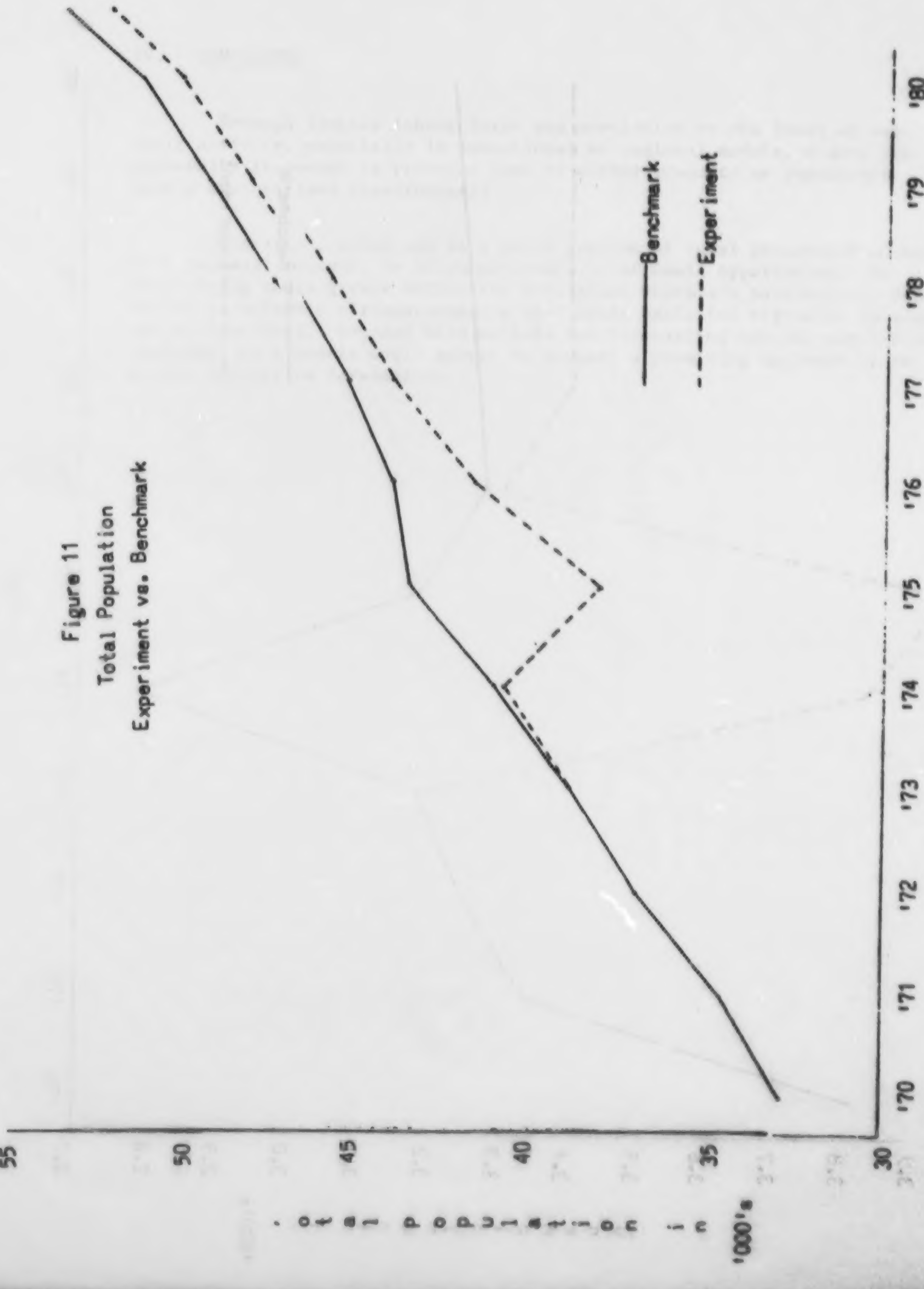
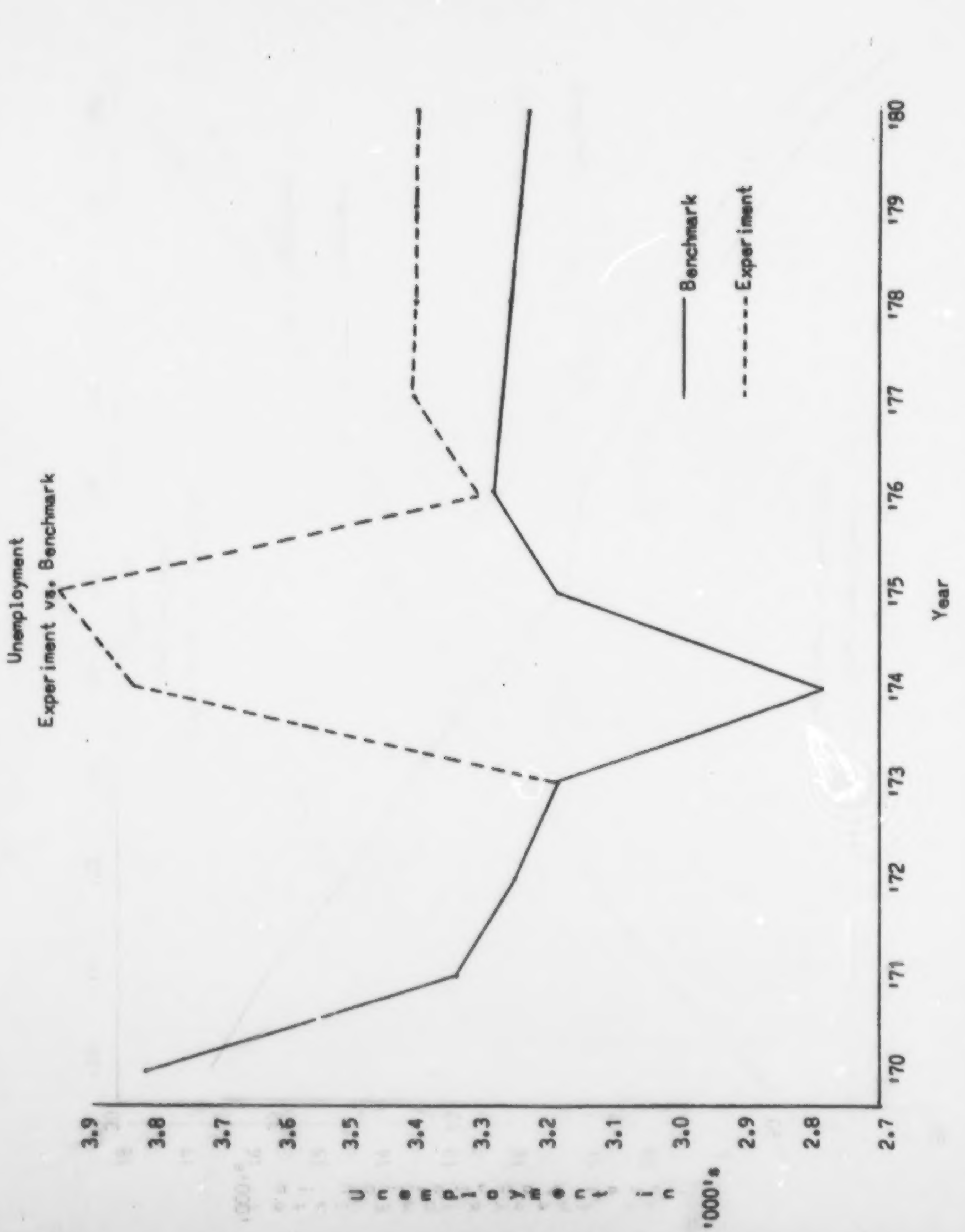


Figure 11
Total Population
Experiment vs. Benchmark


Unemployment
Experiment vs. Benchmark
Benchmark
Experiment
Year
'70
'71
'72
'73
'74
'75
'76
'77
'78
'79
'80
Unemployment in '000's
3.9
3.8
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3.0
2.9
2.8
2.7

IV. CONCLUSION

Through linking labour force and population to the level of economic activity, especially in subnational or regional models, a more comprehensive framework is provided than if either economic or population models are utilized independently.

Migration, which can be a major portion of total population change in a regional economy, is often motivated by economic opportunity. By identifying those groups within the population which are particularly sensitive to economic circumstances, a systematic basis for migration forecasts can be developed. Coupled with methods for forecasting natural population increase, such models would appear to suggest a promising approach to regional population forecasting.

Observations on the Migratory Activity of the Labour Forces of the Yukon and Northwest Territories

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At a previous workshop sponsored by the Committee on Northern Population Research, Mr. Saigaonkar and I presented a paper on population forecasting for the Yukon and Northwest Territories.[1] In that paper, we expressed the opinion that population forecasting in jurisdictions with a small population base was extremely conjectural due to the significant level of migratory activity and to the contingent character of the economic variables affecting this activity.

It is our wish to pursue this topic further and attempt to give a more quantitative expression to the character of migratory activity in the Canadian North, to provide some explanation for this activity and to speculate about the future of such activity insofar as the Northwest Territories and Yukon are concerned.

For purposes of clarity, I wish to define what we mean by the term "migratory activity". We are limiting it to persons who move into or out of the Yukon and Northwest Territories. We do not include persons who move within the political boundaries of these two territories. For the reasons to be explained later, migratory activity, as so defined, appears to be confined to the non-native component of the territorial populations.

In developing quantitative measures of migratory activity, we have confined ourselves largely to the use of census materials. The reason for this is our belief that there is some kind of "optimal" sized population for both territories, given a particular stage of economic development, and that the factors influencing this optimal population are more likely to assert themselves in the long-run. We realize that there is a significant flow of people in and out of the Yukon and Northwest Territories in

1. An Analytical Review of Population Projections for the Northern Territories, R.W. Reid and D.G. Saigaonkar, Proceedings of Northern Population Workshop III, Committee on Northern Population Research, March 1982.

the years between census counts but we believe that this kind of movement, even though these persons may reside in the NWT or Yukon long enough to be designated as residents, is of less importance to the basic economic growth and development of the two territories.

The dimensions of migratory movement

I would first like to provide the evidence for my statement that migratory activity between the NWT and Yukon and the rest of Canada is confined largely to the non-native population component. For this purpose, we reproduce in a slightly abbreviated form some of the information that appeared in our earlier paper. The title to the table explains the data and the statistics from which the percentages were derived are set out in a separate table in the appendix to this paper.

Table 1

NWT & Yukon

Percentage of Total Population
by Ethnicity and Place of Birth

	1941	1951	1961	1971
Non-natives:				
born in territories	7.2	11.9	15.5	15.3
born elsewhere	28.1	39.0	43.4	45.4
Natives:				
born in territories	54.3	44.6	37.6	36.5
born elsewhere	5.4	4.1	3.5	2.8
	100.0	100.0	100.0	100.0

As can be seen, in 1971, about 45% of the entire population of the two territories was of non-native ethnicity and born elsewhere. Thirty years earlier, this group only comprised sligthly more than a quarter of the population.[2] Moreover, by 1971, there were 15,020 persons who had been born in either the NWT or Yukon but who were living elsewhere in Canada. They were equal in number to about 47% of the total non-native component of the existing territorial population but nearly double the number of non-natives who were actually born there. Since most of the people who leave the territories would appear to be of non-native ethnicity, we feel confident in concluding that the migratory movement in and out of the NWT and Yukon is primarily a phenomenon originating with this population element.

In our earlier paper, we advanced the thesis that, for small population groupings, the principal determinant of population size is migratory activity and that this activity is largely influenced by economic events. However, for the Yukon and NWT, we qualified this generalization by making specific reference to the importance of the natural increase of the native population. We decided, therefore, to place the focus of our present analysis upon the labour force.

Our second table provides some aggregated figures on the significance of migratory activity relative to the size of the entire labour force. Census data on this kind of activity was first published for the NWT and Yukon for 1971. The 1976 census data is also shown in order to provide some idea of more recent trends. As noted earlier, for our purpose, a migrant is a person who reported that his place of resident was outside the NWT or Yukon at the time of the previous census.

Even though the percentage of the labour force designated as "migrant" has fallen by about four percentage points between the two censuses, it will be apparent that the percentage of total labour force born outside the NWT and Yukon must be increasing since a person designated as a migrant at the time of the 1971 census will cease to have this designation if he or she still lived in the territories at the time of the 1976 census.

At the present time, the only source of information identifying the migrant labour force of the NWT and Yukon by its occupation categories is the 1971 census. For simplicity of presentation, we have divided the labour force into three groupings: a "specialist" grouping which is composed of persons with occupational skills requiring substantial formal educational

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2. Place of birth was not asked in the 1976 Census questionnaire.

training, a "clerical" grouping which includes all other persons not engaged in manual occupations and, lastly, a "manual occupations" grouping covering the remainder of the labour force including those whose occupations were not identified. The statistics from which these groupings were derived are set out in one of the appendices.

Table 2

NWT & Yukon

Total Labour Force and Migratory Component by Sex for 1971 & 1976

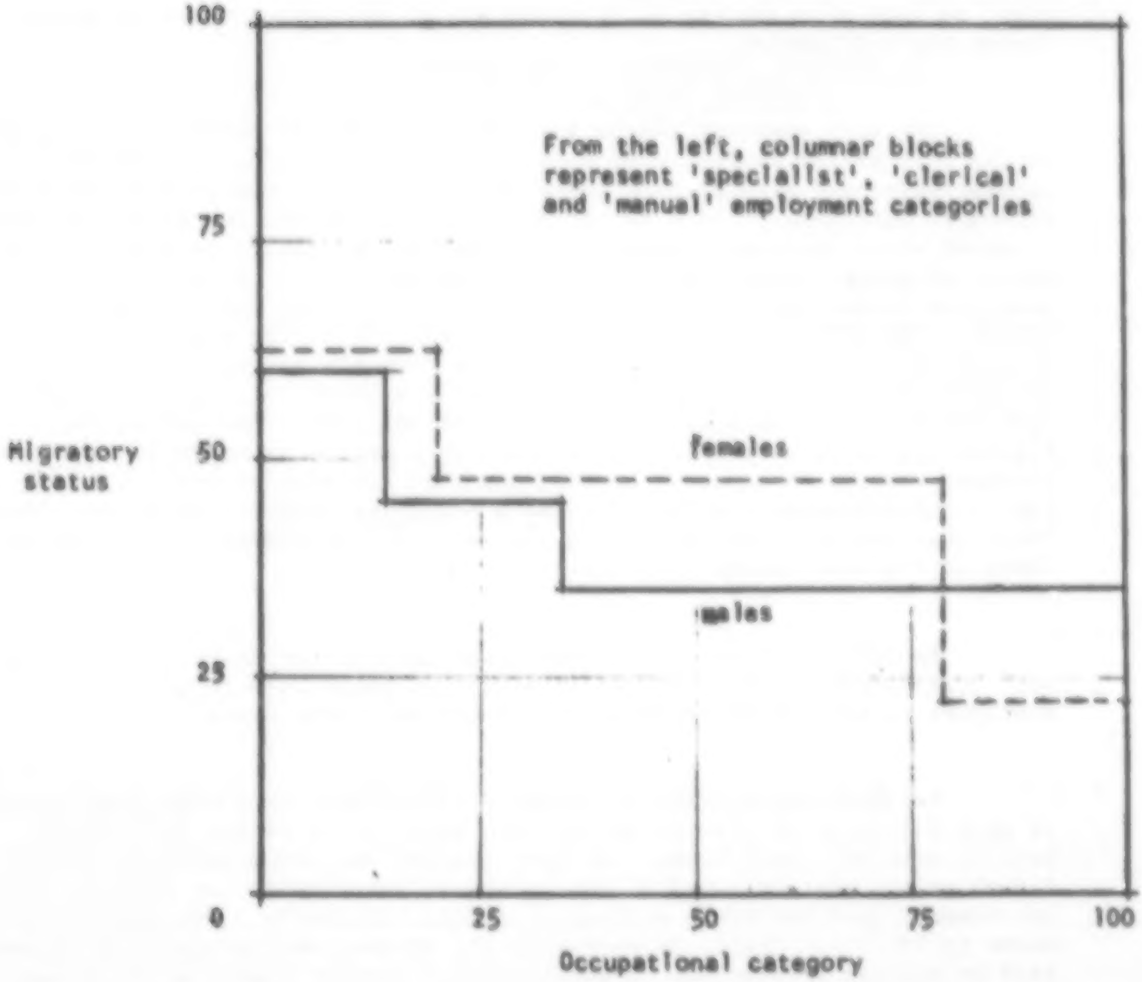
	1971			1976		
	male	female	total	male	female	total
Total labour force	13,175	5,970	19,145	17,685	10,220	27,905
Migrant component	5,365	2,685	8,050	6,480	4,100	10,500
Percentage migrants	40.9%	45.0%	42.1%	36.6%	40.1%	37.8%

The following graph measures on the horizontal axis, for both the male and female members of the labour force, the relative importance of these three groupings within the entire labour force and, on the vertical axis, the percentage of the members of each grouping who migrated to the Northwest Territories and Yukon during the period 1966 to 1971.

What this graph shows is the heavy concentration of migrant labour in the "specialist" and "clerical" categories in the case of both men and women. About 60% of all male members of the specialist category are migrants. The figure for females is 63%. Within the clerical category, 45% of the male employees are migrants with the figure for females being 47%. Only in the manual category is there found significantly lower percentages of migrant labour but even in this category more than a third of the male employees came to the Northwest Territories and Yukon within the five years preceding the 1971 census. Another set of statistics might also provide more of a perspective on this matter. For male employees in the 20 to 34 age group, nearly 71% of all "specialists" were migrants. The corresponding figure for women in this category is 76%.

NWT & Yukon

Percentage distribution of labour force by occupational category, migratory status and sex



Finally, the published statistics from the 1971 census do not permit us to determine what percentage of each of these three categories is made up of persons born outside the Northwest Territories or Yukon. For reasons to be discussed later, we assume that virtually all of the specialist category, both male and female, is composed of such persons.

Incentives for migration

The next problem to examine is the question of why persons migrate to the Yukon or Northwest Territories to take up employment. As a corollary, we must also ask why a large portion of the labour force subsequently leaves the territories.

The most apparent reason for inter-regional movement is the belief on the part of the migrant that work is available and that its income possibilities are greater than those available in the region from which he or she is migrating. There is, of course, an incentive for people to leave a region where employment opportunities are scarce due to persistent high levels of unemployment. However, this does not appear to have been an operative factor in the case of migration to the Yukon and Northwest Territories. The 1976 census revealed that nearly 58% of the migrant labour, of both sexes, to the two territories came from the provinces of British Columbia, Alberta and Saskatchewan - provinces which, at that time, had very low levels of unemployment.[3] In contrast, less than 10% of the migrant labour force came from the Maritime a region of above average unemployment though, of course, the distance that the migrant must travel is a factor which lessens the Maritimes as a source of labour. We assume, therefore, that the principal motive in moving to the Northwest Territories or Yukon is improved income opportunities.

As Table 3 shows, the average wage paid by the major employers in both territories is considerably in excess of those paid by the major employers in the regions from which the migrants were drawn.

Reliable information on income differentials by occupational group is more difficult to acquire and we have been forced to use 1971 census data to make our comparisons. We have limited our comparisons to occupational groups that employed in the Northwest Territories and Yukon at least one hundred male employees working on a full-time basis. The results are shown in Table 4. Again, in virtually all occupational groups, the income paid in the two territories is substantially greater than that in either British Columbia or Alberta. An objection might be made that living costs in the Northwest Territories and Yukon are much greater than those in southern Canadian communities and that the increased salary or wage income merely compensates for this fact. Since few consumer goods are produced in

3. The 1976 Census recorded male unemployment in B.C., Alberta and Saskatchewan at 4.5%, 3.5% and 2.7% respectively. The figures for Ontario and Quebec were 5.2% and 6.9% and for Nova Scotia, New Brunswick and Newfoundland, 8.2%, 9.5% and 15.4%.

either the Northwest Territories or Yukon, these goods must be imported and the remoteness of the northern settlements ensures that their prices will be greater than those paid in southern Canada and that, as an approximation, the differential will be equivalent to the additional transportation and inventory costs. Food prices alone are thought to be about 20% more in Whitehorse and Yellowknife than in the nearest southern Canada metropolitan areas and the differential would be even greater for the more remote northern settlements.

Table 3

Average Weekly Employees Earnings in July for Major Employers

	$\bar{X}$ Weekly earnings	Percentage difference with $\bar{X}$ weekly earnings in B.C.	Alberta	Canada
	$			
1977				
Yukon	359.25	+ 24.5	+ 34.6	+ 42.6
NWT	309.91	+ 7.4	+ 16.1	+ 23.2
1979				
Yukon	403.15	+ 21.8	+ 29.7	+ 38.7
NWT	358.87	+ 8.5	+ 15.5	+ 23.4
1981				
Yukon	507.09	+ 24.5	+ 29.1	+ 42.5
NWT	478.12	+ 17.4	+ 21.7	+ 43.3

Table 4

NWT & Yukon

Minor Occupational Categories containing
100 or More of the Full-time Male Labour
Force in 1970

		Percentage difference from		
	Income	Canada	Alberta	B.C.
Managerial and administration:	$			
government administrators	13,377	- 1.3	+ 12.0	+ 11.7
administrators in teaching and other professions	13,250	- 7.5	- 4.1	- 10.8
accountants and financial	10,904	+ 3.4	+ 4.7	+ 2.4
Professional				
secondary school teachers	11,271	+ 11.6	+ 14.6	+ 6.4
sales				
sales supervisors	9,244	+ 35.4	+ 27.5	+ 28.5
Services				
policemen	10,080	+ 8.4	+ 10.0	+ 11.7
guards-watchmen	6,991	+ 16.5	+ 23.1	+ 3.8
other	7,245	+ 6.4	+ 7.2	+ 5.3
janitors	6,798	+ 23.1	+ 23.2	+ 13.9
Primary producers				
foremen of mines, oil and gas establishments	11,401	+ 5.8	- .2	+ 4.7
miners	9,710	+ 29.1	+ 36.2	+ 9.5
Construction				
foremen (metal)	10,742	+ 22.9	+ 27.6	+ 13.9
mechanical	8,696	+ 32.5	+ 33.9	+ 17.7
repairmen	10,208	+ 26.0	+ 25.0	+ 15.2
excavators	9,512	+ 29.8	+ 32.3	+ 11.0
foremen (wood)	11,089	+ 13.7	+ 8.9	+ 10.2
carpenter	7,640	+ 12.0	+ 7.2	+ 7.0
Transport				
truck drivers	9,192	+ 35.3	+ 28.9	+ 15.7

However, the Consumer Price Index, which is the basis for our perceptions of differences in living costs, is developed from household expenditure patterns in the larger southern Canadian communities and it is most likely that the shares of income spent on different categories of goods and services in the North differ significantly. An example of this is shelter costs which, for many employees in the Northwest Territories and Yukon, are subsidized by the employer.

We conclude then, in the absence of convincing evidence to the contrary, that the remuneration paid most occupational groups in the North provides both a real increase in the income received for labour effort and often permits the accumulation of cash savings at a rate not possible to attain in southern Canada.[4]

There is another incentive to take northern employment which has often been noted. Professor Hamelin has observed that "... the North often presents the opportunity for reaching more quickly the level and prestige of managerial status, a status which could be retained on returning south..." and, as noted, a reasonably large percentage of the labour force of the territories is engaged in "specialist" occupations and the rapid turnover of staff in these occupations surely provides excellent opportunities for career enhancement.[5] If the incentive to migrate to the Northwest Territories or Yukon is the possibility of earning a real increase in income relative to what could be earned elsewhere, then why is it that the rate of out-migration is high? Assuming that labour effort in the NWT and Yukon always commands a premium income, then there must be factors inherent in situation compelling enough to cause the employee to give up this preferred earning situation. There have been a number of studies on this subject, particularly as it applies to the mining industry, and it is to this area that we now wish to turn our attention.

The mining industry - A case study in labour turnover

For the most part, the mining industry in the NWT and Yukon has employed a labour force made up of persons of non-native ethnicity who have migrated to the territories to take up such employment. One study has suggested that the trade skills required by the industry are such that the lack of a local pool of labour with these skills will inevitably limit the employment of northerners to about 25% of the available jobs within the industry.[6]

4. Yukon, J. Hope, Prentice-Hall, N.J. 1976: "...the men who came to work in the Yukon's mines are from southern Canada, the USA and overseas...the typical plan is to remain a year or eighteen months, work hard, save five to ten thousand dollars...".

5. "A Zonal System of Allowances for Northern Workers: An Example of Applied Geography", L.E. Hamelin, Cahiers de Géographie de Québec, 1970.

6. "Alternatives to Northern Resident Staffing of Far Northern Mineral Developments", J.E. Marshall, Northern Mining in the 80's, Proceedings No. 10, Centre for Resource Studies, Queen's University, Kingston, 1980.

For the decade of the 1980's, then, the industry will continue to rely upon migratory labour.

Many mining employees appear to have a lengthy association with the industry, are highly mobile and their movement to and from different mining regions often depends upon the employment opportunities available, promotion prospects if the employee is in the managerial ranks or, if a tradesman, on the opportunity to upgrade work skills. With the possible exception of those in relatively unskilled jobs, mining employers would seem to have no particular partiality towards the region in which they find employment.

This conclusion is suggested by the statistics in the next table which sets out the rate of turnover in the mining industry for all the provinces and territories of Canada. As can be seen, the experience in the NWT and Yukon is not atypical for the industry as a whole. Within the industry itself, one rather dated study indicates that the turnover of managerial personnel in the NWT and Yukon ranges from 5% to 10% a year. The turnover for the skilled mining trades is from 25% to 40% but for unskilled labour, the turnover amounts to almost 300% a year.[7] Presumably most of these individuals leave the territories once they terminate their employment.

If job turnover in the mining industry is primarily a movement to other jobs <u>within</u> the industry, then it would appear to follow that many of the unfavourable characteristics of the North relative to southern Canada, viz., the lack of social amenities, climate and others that have a psychological impact, are of lesser relevance to explaining mobility since most mining settlements share, to varying degrees, these unfavourable characteristics. Most of the sociological studies we have consulted indicate that employment opportunities rank highest on the list of factors prompting movement both to a community and from it.[8] However, the one subjective factor that did stand out in these studies and which, we presume, is very important in the NWT and Yukon is the sense of isolation experienced in the North and the need for access to southern Canadian metropolitan areas.

We concluded, therefore, that, at least for this industry sector, there is little prospect for any significant decline in labour-force migratory activity so long as the primary source for recruitment remains communities south of the 60° parallel.

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7. Report on Mining Employment for the Northwest Territories, R.D. Jelking, DIAND, n.d.

8. The following works were also consulted: (1) Northern Communities: Mental Health and Social Adaptation, J.P. Nickels & J.P. Kehoe, Center for Settlement Studies, University of Manitoba, 1972. (2) Determinants of Labour Turnover in Canadian Mining Communities, J.A. MacMillan, J.R. Tullock, D. O'Brien & M.A. Ahmed, Center of Settlement Studies, University of Manitoba, 1974. (3) Perceived Need Satisfactions of Workers in Isolated Environments, J.M. Cram, PhD Thesis, University of British Columbia, 1969. (4) "Interprovincial Migration in Canada as a Human Capital Decision", G. Laker & R.X. Chase, Journal of Political Economy, July/August 1971. (5) "A Theory of Migration", E.S. Lee, Demography, Vol. 3, No. 1, 1966.

Table 5

Employment and Labour Turnover
in the Mining Industry

	Total employment 1971	Labour turnover 1972	% of employment
Newfoundland	5,247	621	11.8
PEI	-	-	-
Nova Scotia	779	154	19.8
New Brunswick	2,312	1,551	67.1
Québec	21,338	2,791	13.1
Ontario	31,107	11,950	38.4
Manitoba	5,946	6,963	117.1
Saskatchewan	3,785	2,241	59.2
Alberta	147	24	16.3
British Columbia	7,779	2,127	27.3
Yukon and NWT	2,677	1,046	39.1
Total	81,117	29,468	36.3

Future trends

Is there any prospect for a stabilization in the duration of the residency of the populations of the two territories? This will be our concluding question.

Before answering this question, it is necessary to look at the economic structure of the NWT and Yukon. Both economies are relatively simple and are geared towards the production of minerals for export. The economic base of both economies lacks breadth; no capital goods and only a limited range of consumer goods are produced locally and this situation can be expected to prevail indefinitely due to the limited size of their populations and their remoteness from the metropolitan centers of Canada.

Being distinct political jurisdictions of a quasi-provincial character, government employment provides some stability for the economy. Both mining and government pay well and the income generated from these sources have created a services sector to the territorial economic structures which replicate to some extent the amenities available in the smaller southern Canadian communities.

However, mining, government and many of the occupations in the services sector often require employees with skills that cannot be acquired locally because of the absence of post-secondary school facilities or, if available locally through trade training schemes, provide the beneficiaries of such training with skills that can be marketed outside the NWT and Yukon. Inevitably, jobs requiring skills that cannot be acquired locally will require migrant labour and for anybody with a skill commanding a premium wage, there is always the prospects of employment elsewhere.

Furthermore, the narrow base to the territorial economies means that, once a job is lost due to (say) a downturn in economic activity, it becomes almost impossible to find employment in some other occupation providing comparable compensation. Since many persons of non-native ethnicity were not born in the Yukon or NWT, they have few or no emotional ties to the region and with the loss of their employment, there is little reason to remain.

We can only conclude that migratory activity will continue to be an important determinant of population size in both the Yukon and NWT for many years.

APPENDIX I

NWT & Yukon

Total Population by Ethnicity and Birthplace

	1941	1951	1961	1971
Total population:				
non-native	5,978	12,777	22,175	32,030
native	10,964	12,223	15,450	21,165
	16,942	25,100	37,625	53,195
Born in territories and living there:				
non-native	1,214	2,988	5,841	8,155
native	10,047	11,196	14,152	19,400
	11,261	14,184	19,993	27,555
Living in territories but born elsewhere:				
non-native	4,764	9,789	16,334	24,145
native	917	1,027	1,298	1,495
	5,681	10,816	17,632	25,640
Born in territories but living elsewhere:				
non-native	847	n.a.	n.a.	n.a.
native	159	n.a.	n.a.	n.a.
	1,006	2,470	6,035	15,020

Sources: Statistics Canada, Decennial Censuses

APPENDIX II a

NWT & Yukon

Male Labour Force by Occupation, Age and Migratory Status

Occupations	All males 15 + total in group	migrants	% migrants	Males 20-34 total in group	migrants	% migrants
"Specialist":						
Managerial	635	380	59.8	265	190	71.7
teaching	285	220	77.2	210	175	83.3
health & medicine	75	40	53.3	40	30	75.0
technology & social	920	510	55.4	550	360	65.5
	1,915	1,150	60.1	1,065	755	70.9
"Clerical":						
clerks	585	295	50.4	320	180	58.1
sales	645	285	44.2	310	185	59.7
services	1,415	610	43.1	565	330	58.4
	2,645	1,190	45.0	1,195	695	58.2
"Manual":						
farming, animal husbandry	55	10	18.2	15	5	33.3
other primary	1,330	425	32.0	625	280	44.8
processing	285	150	52.6	160	95	59.4
product fabrication	1,170	595	50.9	590	375	63.6
construction	1,580	635	40.2	735	390	53.1
transport	1,045	465	44.5	565	290	51.3
other	3,115	760	24.4	1,535	465	30.3
	8,580	3,040	35.4	4,225	1,900	45.0
Total	13,135	5,365	40.9	6,470	3,360	51.9

Source: Statistics Canada 1971 Census Cat. 92-749, Vol. 1, Part 5

APPENDIX II b

NWT & Yukon

Female Labour Force by Occupation, Age and Migratory Status

Occupations	All females 15+ total in group	migrants	% migrants	Females 20-34 total in group	migrants	% migrants
"Specialist":						
managerial	100	50	50.0	35	20	57.1
teaching	530	350	66.0	350	275	78.6
health & medicine	425	295	69.4	290	230	79.3
technology & social	170	75	44.1	95	60	63.2
	1,750	970	62.9	770	585	76.0
"Clerical":						
clerks	1,450	970	55.4	970	660	68.0
sales	355	140	39.4	125	70	56.0
services	1,330	515	38.7	545	290	53.2
	3,435	1,625	47.3	1,640	1,020	62.2
"Manual":						
farming, animal husbandry	5	-	...	-	-	...
other primary	5	5	100.0	-	-	...
processing	25	10	40.0	10	-	...
product fabrication	170	10	5.9	60	5	8.3
construction	10	5	50.0	5	-	...
transport	35	10	28.6	15	5	33.3
other	1,060	260	24.5	565	150	26.6
	1,310	300	22.9	655	170	26.0
Total	5,970	2,685	45.0	3,060	1,755	57.4

Source: Statistics Canada 1971 Census Cat. 92-749, Vol. I, Part 5

Appendix III

NWT & Yukon

Average Weekly Employee Earnings in July for Major Employers

	Yukon	NWT	B.C.	Alberta	Canada
			dollars		
1977	359.25	309.91	288.60	266.94	251.62
1978	372.86	318.97	304.82	275.19	266.23
1979	403.15	358.87	330.88	310.85	290.75
1980	443.04	403.03	367.01	344.01	317.83
1981	507.09	478.12	407.30	392.74	355.97
1982*	532.57	551.49	440.21	427.85	385.20

Source: Statistics Canada, Employment, Earnings and Hours, Cat. 72-002

* Estimated average for first three months in 1982

APPENDIX IV

NWT & Yukon

Migratory Activity by Sex

	In-migrants: place of residence in 1971			Out-migrants: place of residence in 1976		
	male	female	total	male	female	total
Newfoundland	155	90	245	55	15	70
PEI	25	15	40	10	5	15
Nova Scotia	140	70	210	80	35	115
New Brunswick	60	55	115	25	20	45
Quebec	350	205	555	185	65	250
Ontario	1,195	780	1,975	575	280	855
Manitoba	360	245	605	255	115	370
Saskatchewan	435	320	755	365	190	555
Alberta	1,315	845	2,160	1,715	880	2,595
British Columbia	1,545	980	2,525	1,605	815	2,420
Outside Canada	830	690	1,520		not known	

Source: Statistics Canada 1976 Census, Cat. 94-807

Socio-demographic Field Investigations for the Norman Wells Database Project

Robert M. Bone and John W. Pomeroy

Department of Geography
University of Saskatchewan

1. Introduction

The Norman Wells Oil Field Development and Pipeline Project will have a direct impact on four communities along the MacKenzie River. These communities are Norman Wells, Fort Norman, Wrigley and Fort Simpson. This $1.3 billion mega-project will see Esso Resources Canada Ltd. expand the oil fields and Interprovincial Pipelines Ltd. construct a pipeline from Norman Wells to Zama in northern Alberta. Most of the development is expected to be centred at Norman Wells, which will experience a population explosion from a base population of 350 persons in 1981 to over 1000 by 1983. The three other centres, Fort Norman, Wrigley and Fort Simpson, are not expected to receive large numbers of new residents.

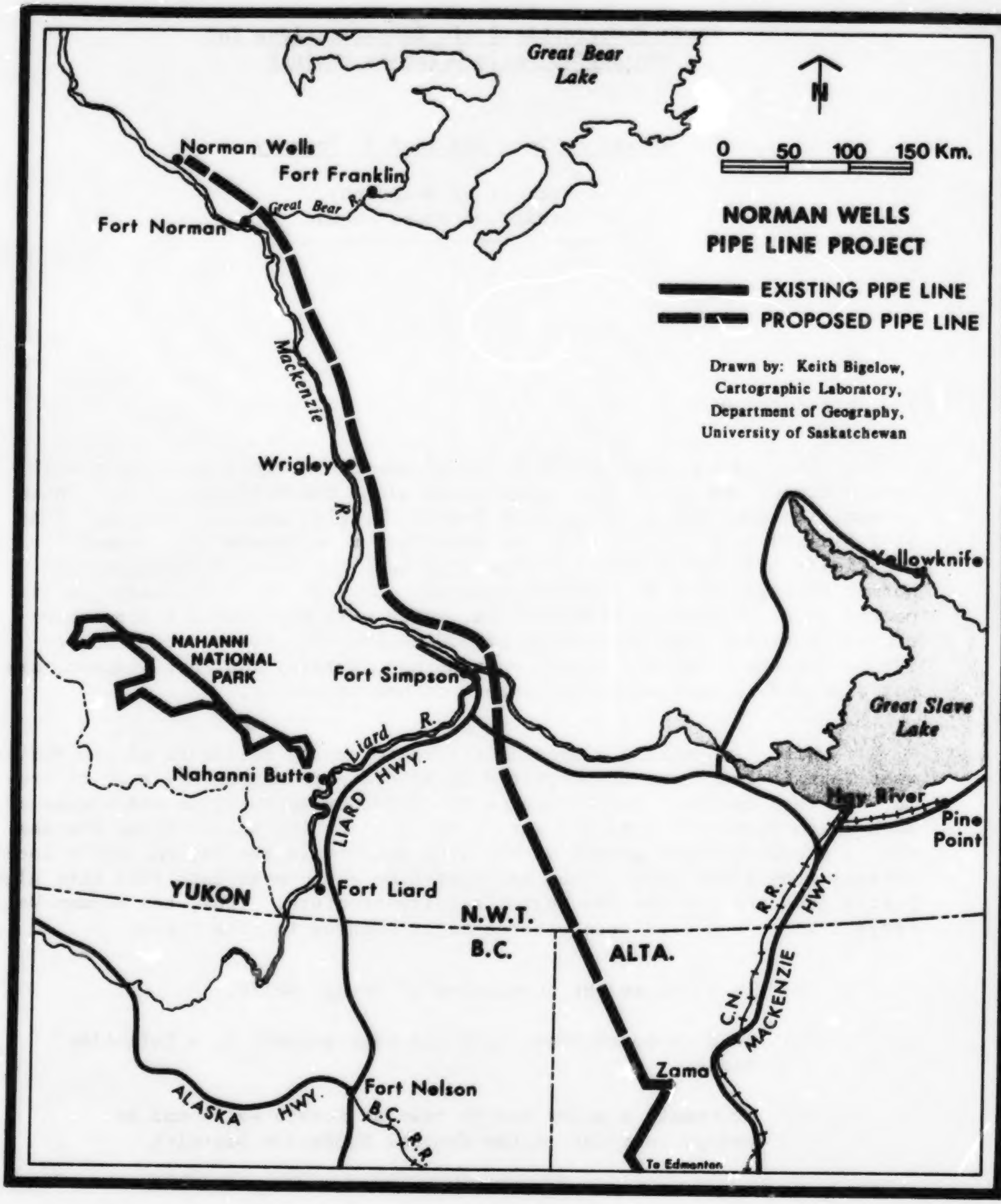
With Esso making a special effort to employ residents of the Northwest Territories, some are expected to relocate in Norman Wells or to commute to this center. Thus, changes in residency, occupation and income of such northerners are forecast during the project lifespan. These changes should accelerate the growth of the wage economy in the region, shift local workers from lower paying jobs and part-time employment into full-time high paying jobs and broaden the region's infrastructure. Thus, the Norman Wells Project is expected to create three major changes in this region:

(1) To increase the population of Norman Wells.

(2) To draw northerners into the wage economy on a full-time basis.

(3) To create a major energy base at Norman Wells and an energy corridor in the Central MacKenzie District.

FIGURE 1


Great Bear
Lake
N
0 50 100 150 Km.
NORMAN WELLS
PIPE LINE PROJECT
EXISTING PIPE LINE
PROPOSED PIPE LINE
Drawn by: Keith Bigelow,
Cartographic Laboratory,
Department of Geography,
University of Saskatchewan
Norman Wells
Fort Franklin
Great Bear R.
Fort Norman
Mackenzie
R.
Wrigley
Yellowknife
NAHANNI
NATIONAL
PARK
Fort Simpson
Great Slave
Lake
Liard R.
Nahanni Butte
LIARD HWY.
Hay River
Pine
Point
Fort Liard
YUKON
N.W.T.
B.C.
ALTA.
R.R.
HWY.
C.N.
MACKENZIE
Zama
Fort Nelson
ALASKA HWY.
B.C. R.R.
To Edmonton

2. The Database Monitoring System

During the course of the hearings of the Federal Environment Assessment Review Panel, local residents expressed a number of concerns over the impact of the proposed industrial development. To enable the Department of Indian and Northern Affairs to monitor the impact on behalf of the residents of the Northwest Territories, the Norman Wells Database Research Team was assembled to design a database of the key socio-demographic elements which could be used to monitor key changes in the four communities. The main elements of this database are (1) population, (2) occupations and income, (3) business activities and public services, (4) price/wage survey, (5) traditional activities, (6) perceptions of the project, and (7) personal shopping patterns.

This database will serve as the cornerstone of the monitoring programme. As illustrated in figure 2, the database-monitoring system is an attempt to measure change in certain variables over time. The purpose of the first survey is to create a database of key elements which are likely to be affected by the proposed Norman Wells Project. The second survey will measure the same variables at a time when the project has advanced sufficiently to have created a strong impact on the people and their economy. The measuring of the differences in the variables from survey 1 to survey 2 will quantify the impact of this project while an analysis of this change will constitute the monitoring report.

3. The Purpose of this paper

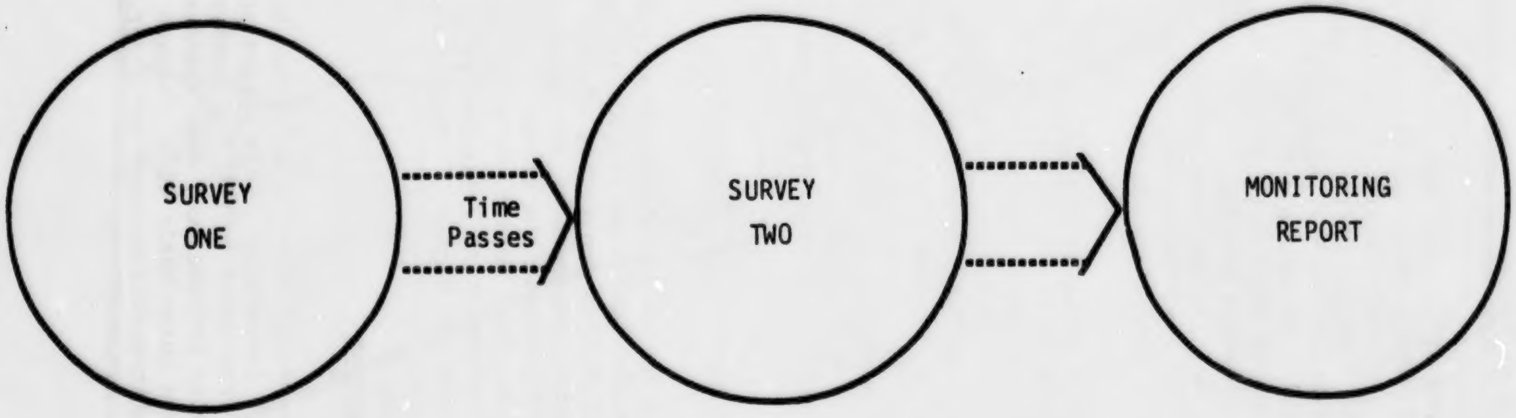
This paper was prepared a few days after the fieldwork and before the database was completed. Consequently, the authors wish to focus attention on two aspects of this monitoring project to the workshop. These aspects are the demographic component of the database design and the field investigations which took place in the summer of 1982. The field team which visited Norman Wells, Fort Norman, Wrigley and Fort Simpson consisted of four members of the Department of Geography at the University of Saskatchewan. They are R.M. Bone, R. Mahnic, T. Murauskas, and J.W. Pomeroy.

4. The Demographic Component

Because of the expected tripling of Norman Wells' population, a key aspect of the database is demography. This aspect involves the creation of a population registry of residents in the four communities. The demographic components of this registry include age, sex, residency by community and descent (ethnicity). From these basic data, changes in population size can be monitored, an age/sex structure created and a potential labour force

FIGURE 2

DATABASE-MONITORING SYSTEM



THE PURPOSE OF SURVEY ONE IS TO CREATE A DATABASE OF KEY ELEMENTS SUBJECT TO IMPACT BY THE PROPOSED NORMAN WELLS PROJECT

THE PURPOSE OF SURVEY TWO IS TO DETERMINE CHANGES IN THE DATABASE

THE PURPOSE OF THE MONITORING REPORT IS TO ACCOUNT FOR THESE CHANGES, AND TO REPORT ON THEIR IMPACT UPON THE FOUR COMMUNITIES

structure compiled (see figure 3). A further division of these two structures can be created by utilizing the response to the ethnicity question (Treaty Indian, Non-status Indian, Metis, Inuit or Other). Coupled with data from two other questions: "your current activities" (full-time job, part-time job, unemployed, housewife, retired, or pre-school) and "your present occupation and employer", two additional demographic structures can be developed.

From these structures, a model of the current demographic labour force can be devised and future changes can be accurately monitored. For example, the change in the number and proportion of native employees by occupation and income can be recorded and then analyzed.

Several theoretical questions related to population change can be examined in the course of this monitoring process and the results could have important implications for public policy. Three key questions are:

(1) Is the population of this region in the "down side" of the Demographic Transition Theory where the birth rate drops rapidly?

(2) As postulated in Push-Pull Migration Theory, is migration responding to wage employment and thus becoming a prominent feature among those entering the labour force?

(3) Are workers with a marginal attachment to the wage economy being drawn into full-time wage employment when demand for workers is substantially increased, i.e. during the boom of a mega-project, as suggested in the Cyclical Response Theory of Labour Supply?

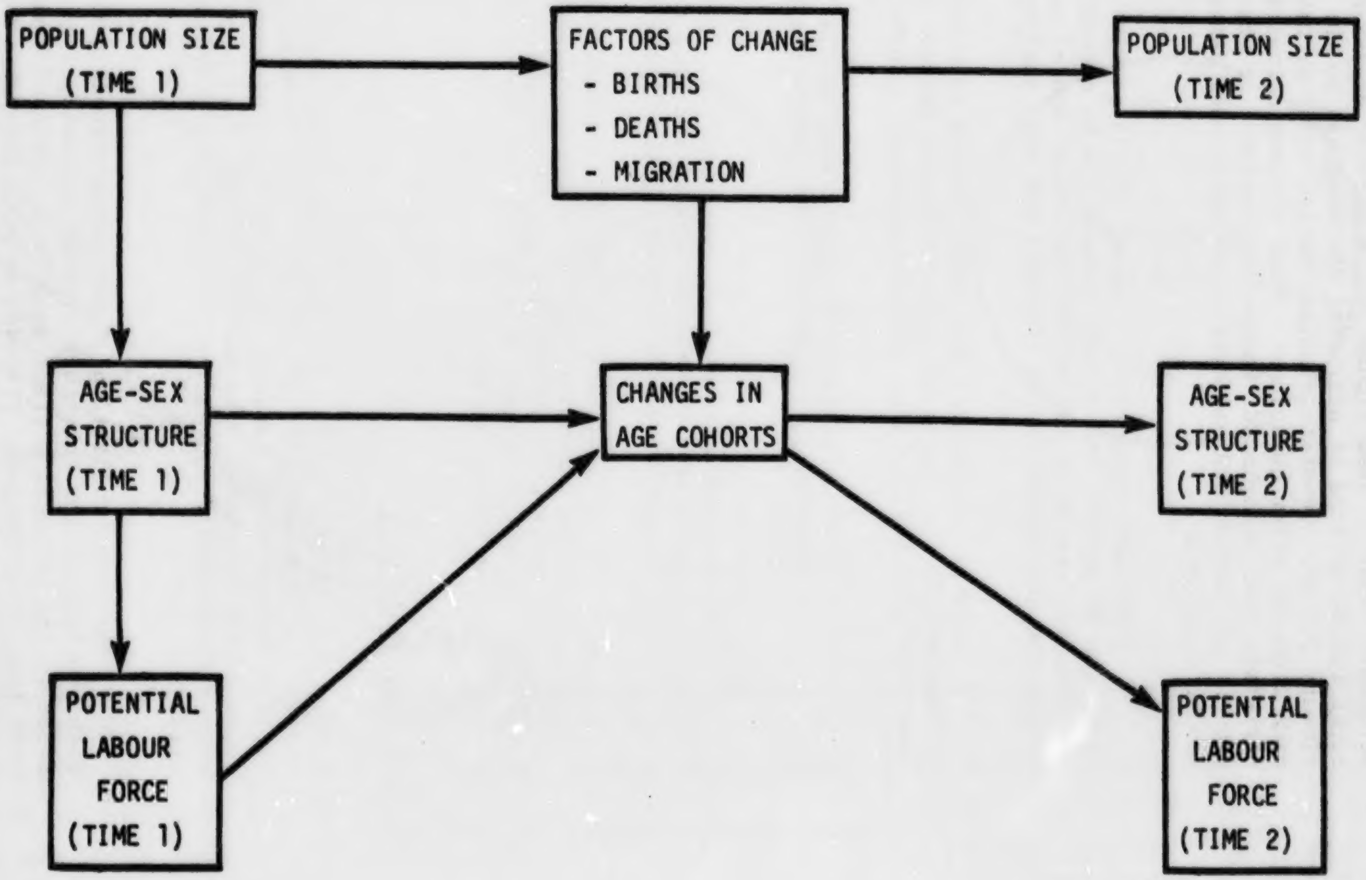
5. The Field Work

The first step in the field program was the design of the questionnaires. A "Community Household Survey" and "Community Business and Public Service Survey" were prepared. Reproductions of these questionnaires are found in the appendix. The results of the field work saw a total of 262 community household surveys and 144 community business and public service surveys.

The field collection of socio-demographic data was by direct contact with the head of the household or with the manager of the firm or agency. Prior to the contact, a great deal of preliminary work was required and this work took three stages: discussions with the Metis Development Corporation; initial contact with local authorities; and testing of the questionnaires. Once these stages were completed, field surveys began in the communities. A follow-up effort was planned to look after 'loose-ends'.

FIGURE 3

DATABASE-MONITORING SYSTEM DEMOGRAPHY



Metis Development Corporation

A special meeting was arranged with the co-ordinator of the Metis Development Corporation and a senior official of the Department of Indian and Northern Affairs. Since this corporation was conducting its own community surveys, we wished to make certain that there was no duplication between our proposed survey and their questionnaires. The Metis Development Corporation was undertaking two surveys (native labour force and northern businesses) in each center in the MacKenzie Valley. Following some discussion, it was clear that there was no major duplication and the Department of Indian and Northern Affairs then authorized the Norman Wells Database Project to proceed.

Initial Contacts

Initial contacts with local authorities began with telephone calls to the managers of the various councils. These calls occurred in mid-June 1982 and their purpose was to identify ourselves and the nature of our proposed work. Arrangements were made with the local officials to meet with their councils. This advanced warning allowed these officials to discuss this matter with their councils before we arrived in their community.

Testing of Questionnaires

Testing of the questionnaires in the field was undertaken in late July 1982. Residents from various ethnic and economic groups in Fort Norman and Norman Wells completed a preliminary questionnaire. Their reaction to the question was noted and these reactions help to initiate several improvements in the two questionnaires. They were:

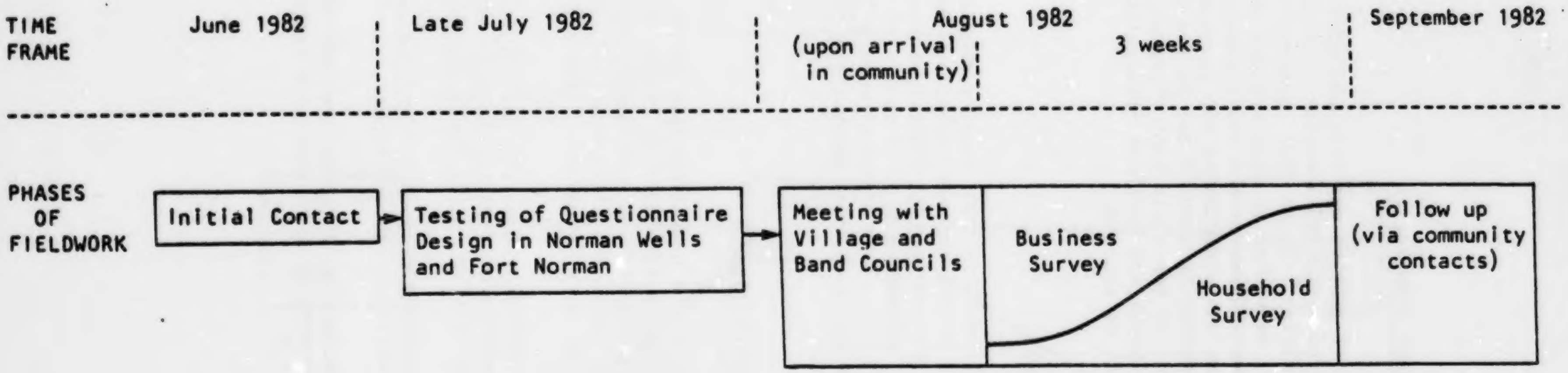
(1) A question about the desirability of joint economic development projects between native organizations and private corporations was added.

(2) Questions regarding migration push-pull factors were simplified and shortened.

(3) The wording of some questions was simplified; and the sequence of questions were rearranged in a more logical order.

FIGURE 4

SOCIO-ECONOMIC DATA COLLECTION PROCESS



Band and Village Council Meetings

In each of the four communities formal meetings were held with the local councils soon after our arrival in town. The purpose of these meetings was to explain the nature and content of the survey to the elected representatives. Following this presentation, their approval of our proposal was sought. We also asked for the names of local residents who might assist us with the survey. Approval and consent was obtained from all the band and village councils. In the case of the Fort Simpson Band, the council felt uncomfortable with the inclusion of individual names on the questionnaire and requested that each respondant be made aware that the identification of the members of the households is optional. The study team agreed to this request and the band accepted the study. All councils and bands requested a copy of the results of the questionnaires for their use in local and regional matters. This request indicates that these councils saw the value in such data and that they did not have this particular information at hand.

Business and Public Service Survey

The Business and Public Service Survey was initiated soon after the local council's approval because it was a shorter and simpler survey than the household one. This survey also permitted the research team to discuss the project with many leading citizens during the business/agency interview. This approach not only gave these people a first hand account of our program but it also provided us with an overview of the business situation in the community.

The Business and Public Service Survey was a major component of the survey work in the large commercial centers of Fort Simpson and Norman Wells. Some firms or agencies in these centers had more than ten employees and these firms provided the bulk of the employment opportunities in the community. The first step in this survey was to prepare a list of businesses and agencies in each community. This list was created from the N.W.T. Databook, 1981, from the telephone book and from the business licenses. Town plans of these communities provided a geographical record of these places. Appointments were made to visit each manager or businessman. During the course of this survey, a request was made to conduct household surveys of the manager and his employees. This approach proved very successful and reduced the number of calls to households. In the case of the two traditional communities, the number of businesses and public services were very small and it took little time to complete.

The managers of several large firms were reluctant to release information for the business survey because company policy did not allow the release of data on its employees or its operations. The local manager

agreed to send our request to his corporate head office. After head office approval, this business information will be sent to us.

Household Survey

This survey was more complicated and contained more sensitive questions than the business/public service questionnaire. The first step in this work was to complete a list of residents. The best single list was the 1981 Territorial Division Plebiscite Voters Registry. Other useful records of residents were the land ownership registry, G.N.W.T. housing registry and telephone book.

In each community, the first household surveys were done in conjunction with the business/public service survey. For those not canvassed at work, Household Surveys were conducted in the person's residence. Almost all the Households Surveys in Wrigley and Fort Norman were done in this manner. In all four centers, local people were hired to assist in this work. This approach was found preferable to having "outsiders" doing all the interviewing for two main reasons:

(1) Many people in the traditional settlements had limited understanding of English.

(2) Residents of the smaller, more isolated communities felt more comfortable being interviewed by a local person.

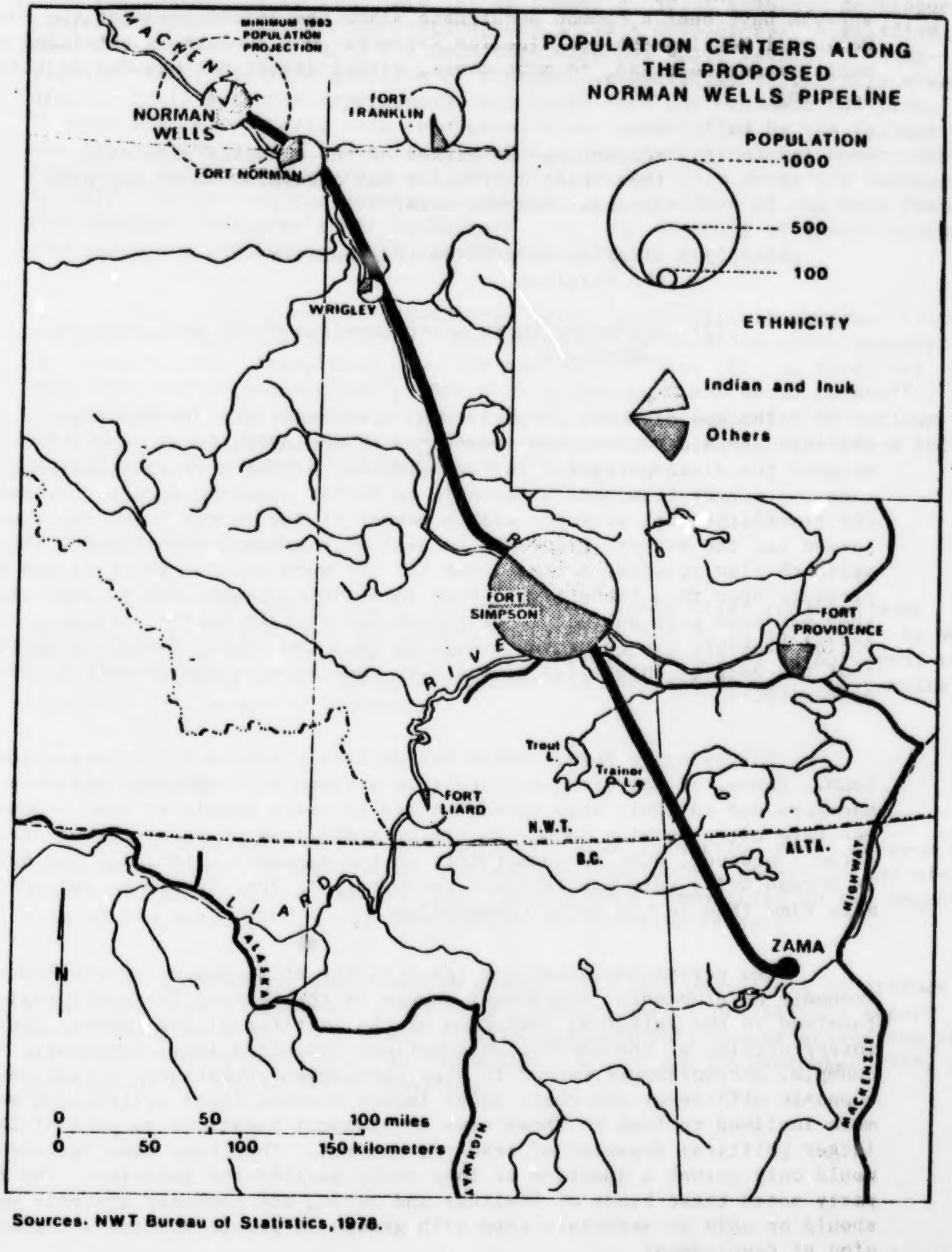
In Fort Simpson, local people were hired as translators because there were a number of homes where only Slavey was spoken. For these dwellings, door to door household interviews were conducted during afternoons and evenings. To insure total coverage of the community households, each house was identified on the town plan map. When the survey was completed, its particular lot was marked on this map. Several times during the day the map was updated by members of the research team to prevent duplication.

The size of the survey work varied from one center to the next. The largest number of households was found in Fort Simpson. See figure 5 for information on the size of the four centers.

Comments on Community Surveying

There is a general reluctance on the part of councils to approve of 'another survey'. This attitude is common to all places and all types of councils. Even with the community's approval, there are bound to exist several 'hard core' areas of resistance where the interviewer will be told in no uncertain terms 'no'.

Figure 5.



Sources. NWT Bureau of Statistics, 1978.

In the case of the communities in the Central MacKenzie Valley, surveys have been a common occurrence since the announcement of the Norman Wells Oil Development and Pipeline Project. Our success in obtaining community acceptance and, in most cases, direct assistance was due to three factors:

(1) respecting the wishes of the councils regarding the survey activities and obtaining their approval to undertake the work;

(2) offering to provide the councils with a copy of the results;

(3) designing short questionnaires which were easy to understand.

The use of local surveyors had advantages and disadvantages. In the case of this survey, the advantages of employing local people far outweighed the disadvantages. In Fort Simpson, hiring a local translator made the survey team more acceptable to Slavey speaking people. By having the translator work directly with a member of the survey team, the local person had the support necessary to deal with awkward situations. This approach also provided a time frame for the work without exerting too much pressure upon this translator. When local interviewers had to work alone, they may have been subject to criticism for working on this project. This social pressure can be strong enough to halt the work. Certainly we found that the pace of interviews slowed down when we were not present in the community.

Surveying in Norman Wells was difficult due to the construction boom. Hence, it was often difficult to arrange meetings with business managers due to their busy schedules and to catch people at home. Businessmen were often working double shifts or spent long hours at the construction sites. However, despite constraints on the managers' time, all the businesses in Norman Wells were successfully surveyed. It just took more patience and more time than in the other communities.

The perception questions involved the attitudes of people towards economic development. Since many people in the Central MacKenzie region are involved in the political evolution of the territorial government, their interpretation of the perception questions reflected local concerns. For example, entrepreneurs tended to view development questions in terms of their economic efficiency and their local impact whereas local politicians were more inclined to look at these same development questions as part of the larger political question of resource control. Then too, some individuals would only answer a question if they could qualify the question. The field party noted these kinds of feelings and during the computer analysis we should be able to associate them with groups of people holding a common opinion of development.

Another problem with the perception question appeared in translation of concepts of economic development into Slavey. For example, question 3 in the Perception Section "Are you in favour of joint economic development projects between native organizations and private developers?" simplified upon translation into "Will the Dene work with the White People?". Individuals reacted to this question of economic co-operation differently according to their personal experiences, political role and economic position. To some Slavey speakers, this co-operation was exemplified by the failure of the locally run Dene Mat Construction Ltd. This native general construction firm received government road and construction contracts until its bankruptcy in 1977. To others, the question referred past relations of the Dene People with Whites. Whatever their background, the vast majority of Slavey stated that economic involvement with the White People was acceptable.

Most other questions translated quite faithfully, if somewhat colourfully, from English into Slavey. For example, the question about consumption of 'country food' translated as, "How much do you live off the land, eat moosemeat and wild chickens?"; "How much do you hunt and shoot to eat?". Slavey responses to degrees of plenty in Slavey were indicated by various hand signals and body language. These responses were then transformed into percentages of country food eaten in the home.

Follow-up Phase

After the completion of the fieldwork, there still remained some households in Fort Norman and Norman Wells which had to be surveyed. As well, people who were on vacations during the fieldwork needed to be surveyed; this work was assigned to our local assistants and they are to mail the results to Saskatoon by the end of September.

6. Conclusions

A key element in the assessment of large industrial projects upon the human environment is demography. Changes in population, employees and migrants all have serious implications for the four communities in the impact area of the Norman Wells Oil Development and Pipeline Project.

In this paper, the research design and field operations to produce a database were discussed. While this paper is only a preliminary report on our baseline study, the field results indicate full co-operation from the northern councils and the local residents. By the end of September 1982, all questionnaires should be in Saskatoon.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

APPENDIX 1

Community Household Survey

Norman Wells Project

GOVERNMENT OF CANADA
DEPARTMENT OF INDIAN AND NORTHERN AFFAIRS

John Scullion
Norman Wells Project Co-ordinator
Department of Indian and
Northern Affairs, Ottawa

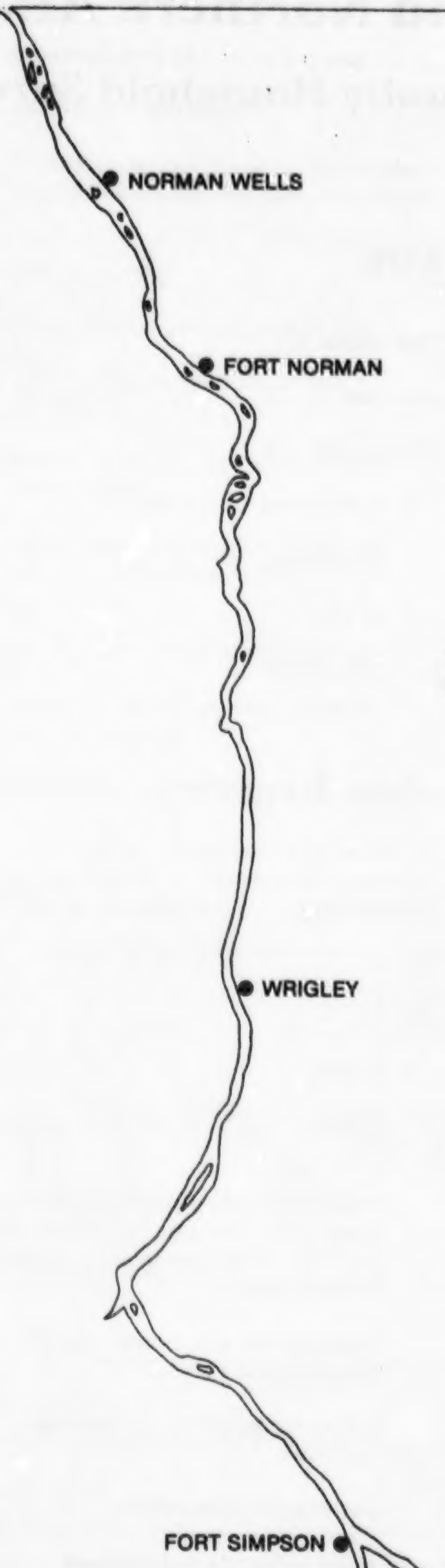
Dear Sir or Madam:

You have been chosen to take part in a database survey of households and businesses in the Norman Wells Project Area, which is being carried out by the Department of Indian and Northern Affairs. The purpose of this database survey is to help the Department and your community monitor changes resulting from the Norman Wells Project.

We do hope you will spare a little of your time to answer some questions about your own experience and opinions. You have been chosen on a scientific basis and it is important that everyone who is chosen does take part, so that we get a true cross-section.

The information you give will be kept strictly confidential.

Thank you very much for your co-operation.



NORMAN WELLS PROJECT

COMMUNITY HOUSEHOLD SURVEY

The purpose of the Department of Indian and Northern Affairs Household Survey is to:

1. Prepare a community database
2. Monitor the impact of the Norman Wells Project in the four MacKenzie Valley communities
3. Provide data for your community and the Department of Indian and Northern Affairs to help maximize job benefits to members of your community

John Scullion

Norman Wells Project Co-ordinator

Department of Indian and Northern Affairs, Ottawa

Department of Indian and Northern Affairs

Norman Wells Project: Community Household Survey

Interview Log

1. Community: ____________________

2. Household Location:

   lot __________ block __________

3. Date: ________ ________ ________
   day month year

4. This house is:

   occupied ☐

   unoccupied ☐

   a. If *occupied*, check result:

      no answer ☐

      refusal ☐

      completed ☐

Population-Occupation Registry

1. Interviewee: ____________________

2. How long have you lived in this community?

   ______ years

3. If you have moved to this community in the last five years, why did you move here? (rank the two most important reasons)

   friends and relatives lived here ____

   attracted by community services ____

   start up a new business ____

   wage employment ____

   liked this community ____

4. If you have moved to this community in the last five years where did you previously live?

   1: ____________________ ____

   2: ____________________ ____

   3: ____________________ ____
   community years

5. Do you or any members of your household plan to leave this community to live permanently in another community in the next 12 months?

   no ☐

   yes ☐

   a. If *yes*,

      where? ____________________

   b. Please rank the advantages of living in the community you plan to move to (rank on a scale of 1 to 8, 1 being most advantageous, 8 being least).

      lower prices and greater variety of goods and services ____

      better recreational-entertainment facilities ____

      better job opportunities ____

      close to friends and relatives ____

      better housing conditions ____

less isolated ______

opportunity to fish, hunt and trap ______

like living in the south ______

c. Please rank the reasons most likely to keep you from moving (rank on a scale of 1 to 8).

cost of moving ______

miss outdoor recreation activities ______

already have a good job in this community ______

loss of close contact with friends and relatives ______

lower prices and greater variety of goods and services in this community ______

loss of opportunity to speak Slavey ______

access to good hunting, trapping, and fishing areas ______

like living in the north ______

6. In the last 12 months, have any members of your household left this community to live permanently in another settlement (excluding students)?

no ☐

yes ☐

a. If yes,

where? ______________________

b. Rank the two most important reasons for the move.

friends and relatives live there ______

attracted by community services ______

start up a new business ______

wage employment ______

like that community ______

7. Occupant Information (list all household members)

Surname							
First Name							
Sex							
Age							
Birthplace							
Marital Status							
Present Activity*							

* Present Activity code: full-time job 1; part-time job 2; unemployed 3; housewife 4; retired 5; student 6; pre-school 7.

8. **Head of household descent:**

	Male	Female
Treaty Indian	☐	☐
Non-status Indian	☐	☐
Metis	☐	☐
Inuit	☐	☐
Other	☐	☐

9. **Full-time worker information**

First Name					
Present Employer					
Present Occupation					
Months Employed					
Annual Wages	A. 1981				
Earned/Expected	B. 1982				
(nearest $1000)	C. 1983				
1981 Occupation					
1983 Occupation					

10. **Part-time and seasonal worker information.**

First Name									
		Wage Employ	Trap/ Fish	Welfare	U.I.C.	Wage Employ	Trap/ Fish	Welfare	U.I.C.
Annual Income	A. 1981								
Earned/Expected	B. 1982								
(nearest $1000)	C. 1983								

Consumer Survey

1. How often do you shop in these places?

	once a week	once a month	a few times a year	never
Norman Wells	☐	☐	☐	☐
Ft. Norman	☐	☐	☐	☐
Wrigley	☐	☐	☐	☐
Ft. Simpson	☐	☐	☐	☐
Inuvik	☐	☐	☐	☐
Yellowknife	☐	☐	☐	☐
Hay River	☐	☐	☐	☐
Ft. Providence	☐	☐	☐	☐
Edmonton	☐	☐	☐	☐
______________	☐	☐	☐	☐

2. Goods and services consumption:

Do you or your household members receive the majority of these goods from business and service institutions in this community?

	Yes	No	N/A	If *No*, where do you receive these goods?
1. Doctor	☐	☐	☐	______________
2. Optician	☐	☐	☐	______________
3. Dentist	☐	☐	☐	______________
4. Banking	☐	☐	☐	______________
5. Appliances-Furniture	☐	☐	☐	______________
6. Drugs-Confectionary	☐	☐	☐	______________
7. Groceries	☐	☐	☐	______________
8. Shoes-Clothing	☐	☐	☐	______________
9. Liquor	☐	☐	☐	______________
10. Hardware	☐	☐	☐	______________
11. Automobiles	☐	☐	☐	______________
12. Lumber	☐	☐	☐	______________
13. Snowmobiles	☐	☐	☐	______________
14. Canoes-Boats	☐	☐	☐	______________
15. Hunting Supplies	☐	☐	☐	______________

3. How much of your *total* shopping bill is spent in:

Norman Wells	_______%
Ft. Norman	_______%
Wrigley	_______%
Ft. Simpson	_______%
Inuvik	_______%
Yellowknife	_______%
Hay River	_______%
Ft. Providence	_______%
Edmonton	_______%
______________________	_______%
TOTAL	_______%

4. How much of your household food is 'country food'?

none or almost none	(0 - 5%)	☐
very little	(6 - 15%)	☐
some	(16 - 39%)	☐
about half	(40 - 60%)	☐
quite a lot	(61 - 75%)	☐
most	(76 - 94%)	☐
all or nearly all	(95 - 100%)	☐

Perception Survey

1. Is there a need for more jobs in the Central Mackenzie Valley?

   yes ☐

   no ☐

   undecided ☐

2. Do you favor increased economic development in the Central Mackenzie Valley?

   yes ☐

   no ☐

   undecided ☐

   a. If *yes*, do you favor:

      large-scale (mega-type) projects ☐

      small-scale (local-type) projects ☐

   b. Rank the following types of development according to your preference on a scale of 1 to 6; 1 being the most preferred, 6 being least preferred.

      forestry ______

      mining ______

      tourism ______

      construction ______

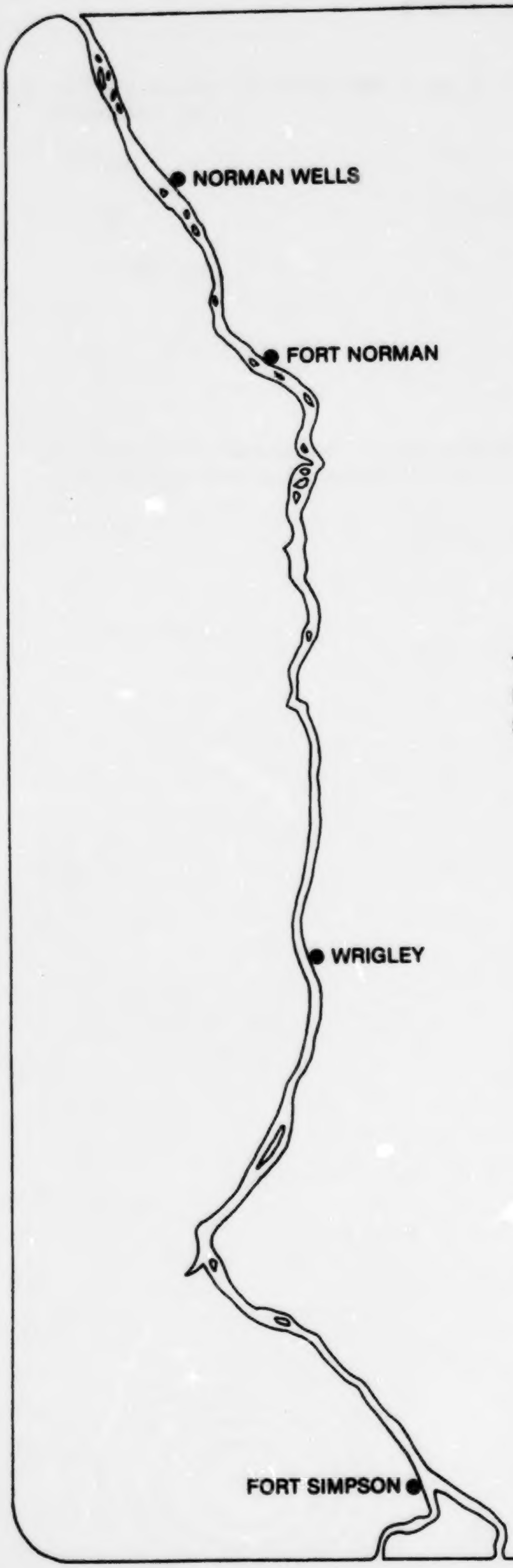
      fish/trap/hunt ______

      market gardens ______

APPENDIX 2

Community Business and Public Services Survey

Norman Wells Project



NORMAN WELLS PROJECT

COMMUNITY BUSINESS AND PUBLIC SERVICES SURVEY

The purpose of the Department of Indian and Northern Affairs Business and Public Services Survey is to:

1. Prepare a community business and public services database
2. Enable the monitoring of the impact of the Norman Wells Project on businesses and public services in your community
3. Provide data for your community and the Department of Indian and Northern Affairs to maximize benefits to the business members of this community and to ensure a continued level of public services

John Scullion

Norman Wells Project Co-ordinator

Department of Indian and Northern Affairs, Ottawa

Department of Indian and Northern Affairs

Norman Wells Project: Community Business Survey

Interview Log

1. Community: ____________________
2. Date: ________ day ________ month ________ year
3. Business name: ____________________
4. Business type: ____________________

Business and Public Services Registry

1. How long has the business/service operated in this community?

   ________ years

2. Employees: (actual or expected)

	June '81	June '82	June '83
full-time			
part-time			

3. Approximately what percentage of your total business/service is attributed to each of the following communities?

   - Norman Wells ______%
   - Ft. Norman ______%
   - Ft. Franklin ______%
   - Ft. Good Hope ______%
   - Wrigley ______%
   - Ft. Simpson ______%
   - ____________ ______%
   - ____________ ______%

4. How do you think the Norman Wells Project will affect your business?

   - increase sales/service ☐
   - decrease sales/service ☐
   - no change in sales/service ☐
   - don't know ☐

5. On the accompanying chart, please estimate the gross wages paid by your business/service in 1981, 1982, and 1983.

	1981	1982	1983
less than $10,000	☐	☐	☐
10,001 - 25,000	☐	☐	☐
25,001 - 50,000	☐	☐	☐
50,001 - 100,000	☐	☐	☐
100,001 - 250,000	☐	☐	☐
250,001 - 500,000	☐	☐	☐
500,001 - 750,000	☐	☐	☐
750,001 - 1,000,000	☐	☐	☐
more than 1,000,000	☐	☐	☐

6. Employee Registry

Surname	First Name	Sex	Age	Birthplace	Last Residence/months	Job Classification	Temporary Resident*

* Temporary Resident: resident of survey community less than 1 year

APPENDIX 1

DEMOGRAPHIC IMPLICATIONS OF MINERAL DEVELOPMENTS IN CANADA'S NORTH: THE EASTERN ARCTIC STUDY CASE STUDIES

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NOTES FOR PRESENTATION TO
NORTHERN POPULATION WORKSHOP IV
FROBISHER BAY (NWT)

EASTERN ARCTIC STUDY OBJECTIVES

1. Constitutional Development in the Northwest Territories.

   - Devolution - Federal to Territorial
     - Territorial to Local

   - Division

2. Land Claim of Inuit Tapirisat of Canada.

3. Regulation of mineral development in the ITC claim area.

STUDY METHODS

1. Following constitutional changes.

2. Following ITC claim negotiations.

3. Case studies of other claim settlements.

   - Alaska
   - James Bay

4. Case studies of actual mineral developments in the Northwest Territories.

   - Nanisivik
   - Polaris
   - Baker Lake
   - Beaufort Sea

5. Future mineral development prospects.

6. Possible political futures for the Northwest Territories.

7. Final report.

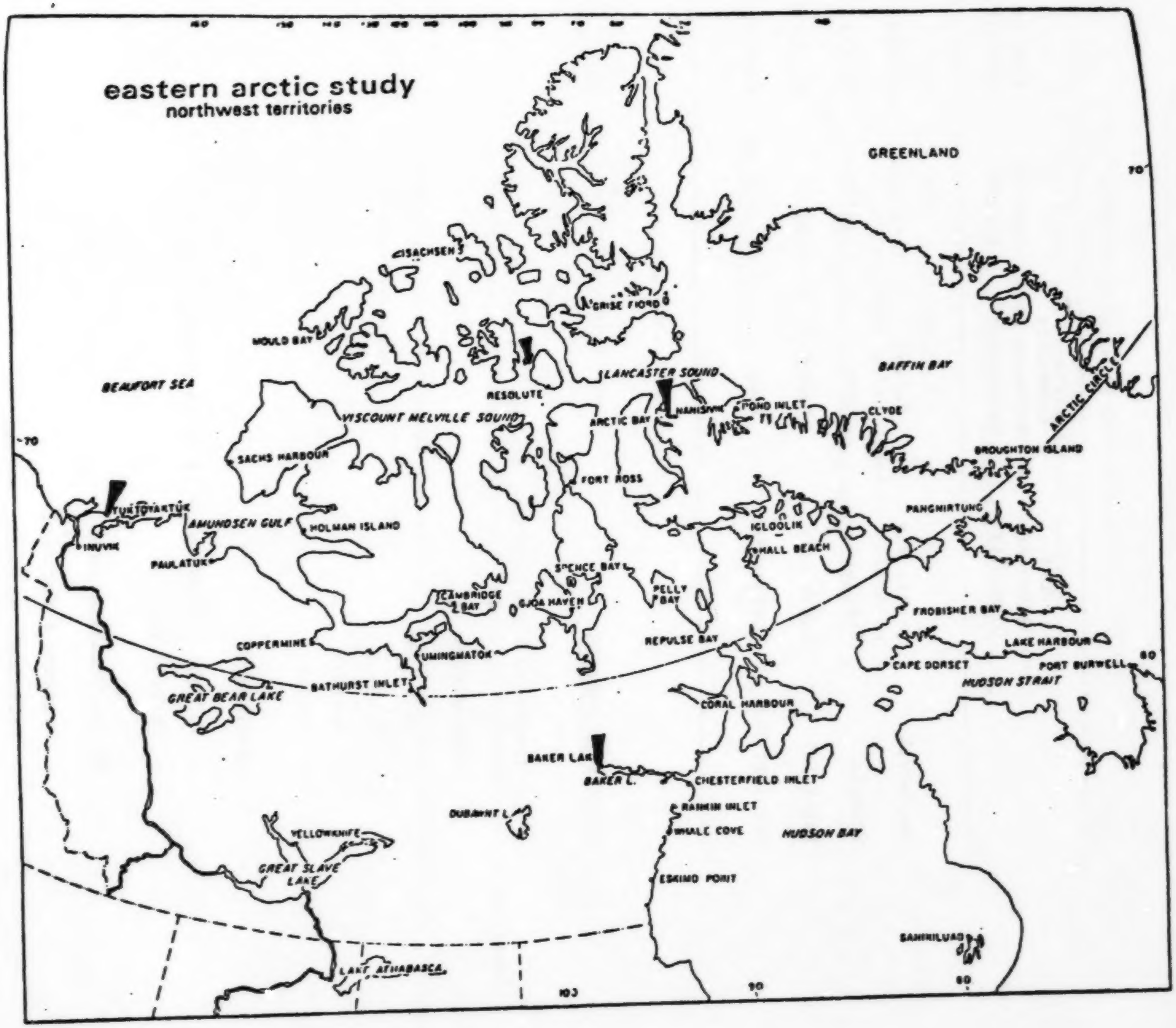

Figure 1. Map of Northwest Territories

MINERAL DEVELOPMENT CASES

	Most Affected Community	Community Exposure to Development	Type of Mineral	Type of Activity
Nanisivik	Arctic Bay	Recent	Lead/Zinc	Mining
Polaris	Resolute	Long	Lead/Zinc	Mining
Baker Lake	Baker Lake	Recent	Uranium	Exploration
Beaufort Sea	Tuktoyaktuk	Long	Oil and gas	Exploration

INTERESTED PARTIES

1. Companies - Exploration, mining, oil and gas.
2. Communities
   - Base camp
   - Transit
   - Nearby
   - Feeder
3. Governments
   - Federal - DIAND plus 15 or 16 others.
   - Territorial
4. Native Organizations
   - Regional & National
   - Political, economic, social
5. Public Interest Groups.

DEVELOPMENT ISSUES FOR EASTERN ARCTIC STUDY

1. Economic Effects of Development
   - Costs and benefits to all parties.
   - Employment opportunities for northerners.
   - Economic spinoff benefits for northerners.
2. Employment Issues
   - Recruitment methods and locations.
   - Employment and working conditions.
   - Training programs.
3. Social Impacts
   - On nearby communities.
   - On regions.
4. Environmental Issues
   - Land, water, renewable resources.
5. Implications of Mineral Resource Potential for Land Claims Settlement.
6. Implications of Mineral Resource Potential for Distribution of Regulatory Powers.

SOCIO-DEMOGRAPHIC ISSUES

1. Environmental Impacts

   - of development
   - of increased population
   - of infrastructure
   - of transportation.

2. Economic Impacts

   - of employment
   - of economic spinoff opportunities

3. Social Impacts

   - of influx of non-northerners
   - of mobility of northern workers
   - of mobility of northern families
   - of access to southern goods
   - of expanded educational opportunities.

NANISIVIK NOTES

Description - New townsite, new airport
- 200 workers, 20-25 percent inuit
- Training program
- Rotation
- Life Expectancy another 5-6 years.

Communities - Arctic Bay (400)
- Other Baffin Region communities - Employment - Igloolik, Hall Beach, Cape Dorset, Lake Harbour, Frobisher Bay, Pangnirtung, Broughton Island.
- Some western communities as well.

Chronology - 1957: TGS began staking
1968: North Baffin economic study by DIAND
1969: Voyage of Manhattan
1972: Untien's statement on northern development. MRI acquired deposit, site & community visits began.
1973: Feasibility study completed.
1974: Memorandum of agreement signed
1975: A.B. protested lack of consultation
1977: Production began.

Major Issues - A.B. - Community consultation
- Townsite
- Airport
- Road
- Environmental
- Employment & training
- Spinoff

Others- Employment & training
- Townsite

EFFECTS OF NANISIVIK ON ARCTIC BAY

1. Environmental: very little. Sea lift is major source of concern.

2. Economic
   - increased cash flow from employment
   - upgraded infrastructure and services from GNWT & DIAND
   - assistance from company
   - relatively little spinoff business
   - short lifetime of mine

3. Social
   - some population loss to Nanisivik
   - some population gain from other northern communities
   - traditional lifestyle maintained to a large extent
   - Inuit control of community council retained
   - no large influx of southerners
   - control of alcohol and access of workers by Nanisivik authorities
   - short lifetime of mine and possibly of airport.

EFFECTS OF NANISIVIK ON 'FEEDER' COMMUNITIES

- Including: Broughton Island, Pangnirtung, Lake Harbour, Cape Dorset, Hall Beach and Igloolik.

1. Economic
   - 20 to 25 employees - increased income in other communities.
   - 400 northerners have had some exposure to employment and training since 1977.
   - Experience and training are portable
   - Mine life only another 5-6 years.

2. Social
   - Some immobility of single workers and/or families
   - Increased cash supports traditional hunting activities
   - Increased contact with southerners and Inuit from Central and Western Arctic.

BAKER LAKE NOTES

Location: About 100,000 sq. kilometers, west north, and south of Baker Lake.

Description - About 24 companies with small air-supplied camps scattered over a very wide area almost entirely during spring and summer months, including caribou migration and calving period.

Communities - Baker Lake

- Keewatin Region - Hunting

Major Issues - Effect on caribou herd

- Purpose of land use permits
- Community role in determining rate etc. of development
- Uncertainties.

Chronology -

1969: Rabbit Lake discovery spurred exploration.

1971: Territorial land use Regulations - not in Keewatin (except part 1)

1973: Council began requesting information on exploration

1974: Council requested freeze on new activities - petition-request refused.

1975: Uranium price rise - more exploration

1975: Council requested freeze (not consulted re TLURS)

: Refused

: ITC requested freeze

: Refused

: TLUR's came into effect (November)

1976: Land use permits granted without consultation

1977: Polar Gas Project under consideration by NEB.

1977: Temporary freeze on new permits - 78,000 sq. km. some exploration continued.

1978: Freeze ended, but temporary injunction granted.

1979: Court case heard, injunction lifted.

1980: Caribou protection measures meetings initiated.

EFFECTS OF EXPLORATION ON BAKER LAKE

1. Environmental

   - Exploration camps and activities
   - Flying over migration routes and calving areas
   - Off-loading supplies in winter.

2. Economic

   - Few employment opportunities
   - Some spinoff opportunities
   - Uncertainty
     - nature of mineral exploration
     - wide range of types of companies
     - very large areas affected briefly
     - nature of mineral markets
     - nature of the mineral: uranium.

3. Social

   - Seasonal influx of southerners
   - Community split over attitude to development
   - Major decisions must be faced in the future if development actually occurs.

POLARIS NOTES

Description - Bunkhouse accommodation for 200 workers.
- Standard op. workforce 175 northerners, 28 from Baffin - Central Arctic.
- Training program - Rotation 6 weeks on - Long life expectancy.

Communities - Resolute 500
- Other - Employment - Arctic Bay, Pelly Bay, Spence Bay, Igloolik, Coppermine, Pangnirtung, Cambridge Bay, Rankin Inlet, Pond Inlet, Gjoa Haven, Frobisher Bay - plus Yellowknife area.

Chronology - 1960: Lead and zinc discovered during oil and gas exploration.

1964: Cominco acquires deposit

1972: Feasibility study

1973: Barrett visits and study begins

1974: Discussions with Federal government begin.

1975: Environmental concerns

1976: Decision - no EARP process

1980: Letter of agreement signed - socio-economic terms to GNWT.

: Water board meeting

: IDC given employment contract.

1981: Water licence granted

: Late - production begins.

1982: August - 1st concentrate shipped.

Major Issues - Consultation process

- Environmental review
- Effects on Resolute
- Bunkhouse vs family accommodation.

EFFECTS OF POLARIS ON RESOLUTE

1. Environmental
   - Concerned about effects of the mine activities on hunting and fishing.
2. Economic
   - Employment opportunities
   - Spinoff opportunities
   - Long-term prospects
3. Social
   - Overcrowding of residential and other facilities feared.
   - Concern over possibility of large influx of families and friends of workers.
   - Large exposure to southerners in transit to the mine.

EFFECTS OF POLARIS ON 'FEEDER' COMMUNITIES

- Including Frobisher, Cambridge Bay, Igloolik, Pond Inlet, Coppermine, Clyde River, Pangnirtung, Cape Dorset, Holman Island, Spence Bay, Pelly Bay and Gjoa Haven.

1. Economic Effects

   - Employment and training opportunities
   - Little spinoff opportunity

2. Social

   - Increased mobility of single workers - family problems
   - Concern over 'skimming' effect.

BEAUFORT NOTES

Description
- DOME - Base at Tuktoyaktuk - Expanding to McKinley Bay.
- ESSO - Base at Tuktoyaktuk - Expanding to McKinley Bay.
- GULF - Starting up - Expanding to McKinley Bay.
- Drilling from ships & islands in Beaufort.
- Workforce, rotation, training - on the job plus Tuktoyaktuk teck.

Communities
- Tuktoyaktuk - Base.
- Inuvik - Transit & spinoff
- Other - employment - BSCAC - Sachs Harbour, Holman Island, Cambridge Bay, Coppermine.

Chronology
- 1970: Esso strikes oil at Atkinson Point
  1972: Dome applies for offshore permit.
  1973: Esso's first artificial island
  1975: OPEC price increase
  1976: Energy policy statement stresses need for accelerated exploration.
  : Dome receives offshore permit.
  : BSCAC organized.

1980: NEP

1981: BEARP appointed.

: New Federal policy on northern land use proposed planning.

1982: COGLA took over regulation from DIAND.

Major Issues - Planning and regulatory process

- BSCAC, DIAND, BSO, GNWT, Land use planning region, COGLA, BEARP
- Environment hearing & impacts
- Real meaning of consultation
- Effects on communities especially Tuktoyaktuk and Inuvik of influx of southerners, changes etc.
- Long-term prospects
- Role of BSCAC

EFFECT OF BEAUFORT EXPLORATION ON TUKTOYAKTUK

1. Environmental

   - Community physically altered by presence of the base camps.
   - Gravel
   - Concern over potential for oil spills.

2. Economic

   - Employment and training opportunities
   - Spinoff opportunities
   - Long-term prospects

3. Social

   - Influx of southerners - some segregation.
   - Inuit have retained control of Council, but development controls the agenda.
   - Heavy demands on housing and facilities.
   - Traditional lifestyle threatened by overwhelming numbers of outsiders, and economic opportunities.
   - Greatly increased political sophistication.

EFFECTS OF BEAUFORT ON 'FEEDER' COMMUNITIES

Including: Sachs Harbour, Holman Island, Cambridge Bay, Gjoa Haven, Spence Bay, Pelly Bay, Coppermine, Inuvik, Aklavik, Arctic Red River, etc.

1. Environmental (anticipated)

   - Oil spills
   - Tanker traffic
   - Pipelines

2. Economic

   - Employment & training
   - Economic spinoffs - especially in MacKenzie Delta.

3. Social

   - Increased mobility of single workers on rotation shifts.
   - Increased political sophistication through participation in BSCAC and EARP process.
   - Traditional lifestyles - rotation and increased income level may help to preserve.

OTHER DEVELOPMENTS

	Peak Manpower Estimates: Construction	Peak Manpower Estimates: Operations
Present		
Cullaton Lake		116
Contwoyto Lake	265	200
Future		
Polar Gas Pipeline	10,000 (1988)	
Beaufort Sea Production Phase	8,882 (1990)	
Arctic Pilot Project	1,277 (1985)	

Potential

Uranium	- Baker Lake Area (Urangesellschaft etc.)
	- Melville Peninsula (Noranda)
	- Baffin Island (Dejour)
Base Metals	- Baker Lake South - Greenstone Belt
	- Noranda etc.
	- Bathurst Inlet
	- Cornwallis Island - Cominco
Gold and Silver	- Bathurst Inlet - Coast and south
	- Greenstone Belt
Iron Ore	- Baffin Island
	- Melville Peninsula

SOME SOCIO-DEMOGRAPHIC CONSIDERATIONS FOR THE FUTURE

1. Planning and regulation - Who will do it?

2. Community options for resource development -
   e.g. Base - expansion of existing community - assimilation
   Nearby, with free access to new community
   Nearby, with limited access - integration
   Transit - expansion
   Feeder
   No contact - isolation.

3. Identifying community interests and establishing appropriate means for consultation.

4. Information needs.

5. Education needs

   e.g. for traditional lifestyle
   for participation in consultation
   for employment, both before and during
   for spinoff opportunities.

6. Working conditions -

   e.g. rotation schedules
   single or family accommodation
   portability of training etc.
   turnover ratio.

7. Socio-economic considerations vs revenue considerations in energy mega-projects.

APPENDIX 2

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Other reports available through the / Autres publications disponibles au

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Comité de recherche sur les populations nordiques

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